IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF MASSACHUSETTS

BIO-RAD LABORATORIES, INC., Plaintiff, and PRESIDENT AND FELLOWS OF HARVARD COLLEGE Co-Plaintiff as to certain claims, v. 10X GENOMICS, INC., Defendant.	Civ. No. 1:19-cv-12533-WGY **JURY TRIAL DEMANDED**
10X GENOMICS, INC., Counterclaim Plaintiff, and PRESIDENT AND FELLOWS OF HARVARD COLLEGE Counterclaim Co-Plaintiff as to certain claims, v. BIO-RAD LABORATORIES, INC., Counterclaim Defendant.	

10X GENOMICS, INC.'S ANSWER TO BIO-RAD LABORATORIES, INC. AND PRESIDENT AND FELLOWS OF HARVARD COLLEGE'S COMPLAINT AND 10X GENOMICS INC.'S SECOND AMENDED COUNTERCLAIMS AGAINST BIO-RAD LABORATORIES, INC. AND CERTAIN AMENDED COUNTERCLAIMS AGAINST HARVARD

10X Genomics, Inc. ("10X") hereby answers the Complaint of Bio-Rad Laboratories, Inc. ("Bio-Rad") and President and Fellows of Harvard College ("Harvard") (collectively, "Plaintiffs"). On April 30, 2020, the Court denied 10X's motions to dismiss but granted 10X's motion to transfer Bio-Rad's claims related to U.S. Patent No. 10,190,115 (the "115 Patent") to the United States District Court for the Northern District of California. ECF No. 99. As such, 10X is not required to answer the Complaint's claims related to the 115 Patent in this Court. Further, 10X was not required to answer the Complaint until after the Court resolved 10X's motions to dismiss. *See Bay State HMO Mgmt. v. Tingley Sys*., 152 F. Supp. 2d 95, 122 (D. Mass. 1995); Order accepted on July 18, 2001 by *Tingley Sys., Inc. v. CSC Consulting, Inc.*, 152 F. Supp. 2d 95, 98 (D. Mass. 2001). In addition, the Court stayed the case, including all deadlines and all Court's orders for 90 days beginning on March 30, 2020. ECF Nos. 93, 94; March 26, 2020 Hrg. Tr. at 20-21.

10X had not answered the Complaint with respect to any of the specific grounds set forth in 10X's Motions to Dismiss, and thus 10X hereby answers as follows:

NATURE OF THE ACTION

1. 10X admits that Plaintiffs purport to bring claims under the patent laws of the United States, Title 35 of the United States Code. Except as expressly admitted, 10X denies each and every allegation set forth in Paragraph 1 of the Complaint.

2. 10X admits that Plaintiffs purport to bring claims under the patent laws of the United States, Title 35 of the United States Code, which relate to U.S. Patent Nos. 8,871,444 (the "444 Patent") and 9,919,277 (the "277 Patent"). 10X admits that Exhibit 1 purports to be an uncertified copy of the 444 Patent. 10X admits that Exhibit 14 purports to be an uncertified copy of the 277 Patent. Except as expressly admitted, 10X denies each and every allegation set forth in Paragraph 2 of the Complaint.

3. The Court transferred Bio-Rad's claims related to the 115 Patent to the United States District Court for the Northern District of California, and therefore 10X does not respond here to any Bio-Rad allegation in the corresponding paragraph of the Complaint regarding the 115 Patent. ECF No. 99.

THE PARTIES

4. 10X is informed and believes, and on that basis admits, that Bio-Rad is a corporation organized and existing under the laws of the State of Delaware, having a principal place of business at 1000 Alfred Nobel Drive, Hercules, CA 94547. The Court transferred Bio-Rad's claims related to the 115 Patent to the United States District Court for the Northern District of California, and therefore 10X does not respond here to any Bio-Rad allegation in the corresponding paragraph of the Complaint regarding the 115 Patent. ECF No. 99. 10X lacks sufficient knowledge or information to form a belief as to the truth or falsity of the remaining allegations set forth in Paragraph 4 and on that basis denies them.

5. 10X is informed and believes, and on that basis admits, that Harvard is a Massachusetts institution with a principal place of business at 1563 Massachusetts Ave., Cambridge, Massachusetts 02138. 10X lacks sufficient knowledge or information to form a belief as to the truth or falsity of the remaining allegations set forth in Paragraph 5 and on that basis denies them.

6. 10X admits that 10X is a corporation organized and existing under the laws of the State of Delaware. 10X denies that its current principal place of business is 7068 Koll Center Parkway, Suite 401, Pleasanton, CA, 94566. 10X's principal place of business is at 6230 Stoneridge Mall Road, Pleasanton, CA 94588.

JURISDICTION AND VENUE

7. 10X admits that Plaintiffs purport to bring claims under the patent laws of the United States, Title 35 of the United States Code. Except as expressly admitted, 10X denies each and every allegation and/or legal conclusion set forth in Paragraph 7 of the Complaint.

8. The Court transferred Bio-Rad's claims related to the 115 Patent to the United States District Court for the Northern District of California, and therefore 10X does not respond here to any Bio-Rad allegation in the corresponding paragraph of the Complaint regarding the 115 Patent. ECF No. 99. Paragraph 8 of the Complaint states a legal conclusion to which no response is required. To the extent a response is required, 10X admits that this Court has subject matter jurisdiction over this action relating to Counts I and II under Title 28 U.S.C. §§ 1331 and 1338(a).

9. 10X admits that, for the purposes of Counts I and II of the Complaint only, this Court has personal jurisdiction over 10X. 10X admits that it has sold Next GEM products to customers in Massachusetts, including to Harvard. The Court transferred Bio-Rad's claims related to the 115 Patent to the United States District Court for the Northern District of California, and therefore 10X does not respond here to any Bio-Rad allegation in the corresponding paragraph of the Complaint regarding the 115 Patent. ECF No. 99. Except as expressly admitted, 10X denies each and every allegation and/or legal conclusion contained in Paragraph 9 of the Complaint.

10. 10X admits that, for the purposes of Counts I and II of the Complaint only, this Court has personal jurisdiction over 10X. The Court transferred Bio-Rad's claims related to the 115 Patent to the United States District Court for the Northern District of California, and therefore 10X does not respond here to any Bio-Rad allegation in the corresponding paragraph of the Complaint regarding the 115 Patent. ECF No. 99. 10X admits that Exhibit 20 appears to be a printout of a webpage, titled "10x Single Cell Seminar - Longwood Medical." 10X admits that Paragraph 10 of the Complaint identifies a single seminar that 10X personnel conducted at Longwood Medical in

Boston, Massachusetts on September 3, 2019, which included discussion of 10X's proprietary Next GEM platform. Except as expressly admitted, 10X denies each and every allegation and/or legal conclusion contained in Paragraph 10 of the Complaint.

11. 10X admits that, for the purposes of Counts I and II of the Complaint only, this Court has personal jurisdiction over 10X. The Court transferred Bio-Rad's claims related to the 115 Patent to the United States District Court for the Northern District of California, and therefore 10X does not respond here to any Bio-Rad allegation in the corresponding paragraph of the Complaint regarding the 115 Patent. ECF No. 99. 10X admits that it has a written license agreement with Harvard ("Harvard-10X License Agreement"). 10X admits that it contended in *Bio-Rad Labs. Inc. v. 10X Genomics, Inc.*, C.A. No. 19-01699-RGA (D. Del. Dec. 4, 2019), ECF No. 13 ("Delaware Litigation"), that it has an implied license to the 444 and 277 Patents arising from the Harvard-10X License Agreement. 10X admits that the Harvard-10X License Agreement states, *inter alia*, the words recited in the block quote in Paragraph 11 of the Complaint. 10X admits that it asserted that "Harvard's claims under the 444 and 277 Patents are barred at least by an implied license arising from the Harvard-10X License Agreement." Delaware Litigation, ECF No. 13, at 3. 10X further admits that it contended in the Delaware Litigation that the quoted forum selection clause applies to Plaintiffs' causes of action for infringement of the 444 and 277 Patents only. Except as expressly admitted, 10X denies each and every allegation and/or legal conclusion contained in Paragraph 11 of the Complaint.

12. 10X admits that the Complaint purports to base venue on 28 U.S.C. §§ 1391(b) and (c), and 28 U.S.C. § 1400(b). 10X admits that it has a written license agreement with Harvard ("Harvard-10X License Agreement"). 10X admits that it contended in the Delaware Litigation that it has an implied license to the 444 and 277 Patents arising from the Harvard-10X License

Agreement. 10X admits that the Harvard-10X License Agreement states, *inter alia*, the words recited in the block quote in Paragraph 11. 10X admits that it asserted that "Harvard's claims under the 444 and 277 Patents are barred at least by an implied license arising from the Harvard-10X License Agreement." Delaware Litigation, ECF No. 13, at 3. 10X further admits that it contended in the Delaware Litigation that the quoted forum selection clause applies in this present litigation only to Plaintiffs' causes of action for infringement of the 444 and 277 Patents, not the 115 Patent. The Court transferred Bio-Rad's claims related to the 115 Patent to the United States District Court for the Northern District of California, and therefore 10X does not respond here to any Bio-Rad allegation in the corresponding paragraph of the Complaint regarding the 115 Patent. ECF No. 99. Except as expressly admitted, 10X denies each and every allegation and/or legal conclusion contained in Paragraph 12 of the Complaint.

13. The Court transferred Bio-Rad's claims related to the 115 Patent to the United States District Court for the Northern District of California, and therefore 10X does not respond here to any Bio-Rad allegation in the corresponding paragraph of the Complaint regarding the 115 Patent. ECF No. 99.

BACKGROUND

14. 10X is without information or knowledge sufficient to form a belief as to the truth of the allegations in Paragraph 14 of the Complaint and, therefore, denies those allegations.

15. 10X is without information or knowledge sufficient to form a belief as to the truth of the allegations in Paragraph 15 of the Complaint and, therefore, denies those allegations.

16. 10X admits Bio-Rad began offering QuantaLife's droplet digital PCR product in 2011 following Bio-Rad's acquisition of QuantaLife. 10X is without information or knowledge sufficient to form a belief as to the truth of the remaining allegations in Paragraph 16 of the Complaint and, therefore, denies those allegations.

17. 10X denies that "Bio-Rad's droplet digital technology was a breakthrough that greatly advanced the capabilities of PCR and NGS." 10X is without information or knowledge sufficient to form a belief as to the truth of the remaining allegations in Paragraph 17 of the Complaint and, therefore, denies those allegations.

18. 10X admits that Bio-Rad's ddSEQ Single-Cell Isolator encapsulates single cells and barcodes into subnanoliter droplets, and that cellular lysis and barcoding of cellular messenger RNA occur in those droplets. 10X admits that Bio-Rad's ddSEQ products are used to generate libraries that can be used in sequencing for single cell analysis. 10X is without information or knowledge sufficient to form a belief as to the truth of the remaining allegations in Paragraph 18 of the Complaint and, therefore, denies those allegations.

19. 10X is without information or knowledge sufficient to form a belief as to the truth of the allegations in Paragraph 19 of the Complaint and, therefore, denies those allegations.

20. 10X admits, upon information and belief, that Bio-Rad has stated publicly that it has paid $162 million to acquire QuantaLife; that Bio-Rad acquired RainDance Technologies, Inc. ("RainDance"); and that Bio-Rad has stated publicly that it paid $87 million to acquire RainDance. 10X is without information or knowledge sufficient to form a belief as to the truth of the allegations in Paragraph 20 of the Complaint and, therefore, denies those allegations.

21. 10X denies that the technology RainDance licensed from the University of Chicago is "foundational" droplet technology. 10X is without information or knowledge sufficient to form a belief as to the truth of the remaining allegations in Paragraph 21 of the Complaint and, therefore, denies those allegations.

22. 10X admits that 10X Genomics (then 10X Technologies, Inc.) was founded in Pleasanton, California, in 2012, by Dr. Serge Saxonov, Dr. Benjamin Hindson, and Dr. Kevin Ness,

who were former employees of QuantaLife and were briefly employed by Bio-Rad after Bio-Rad purchased QuantaLife. 10X denies the remaining allegations in Paragraph 22.

23. 10X admits that it launched its GemCode™ product line in 2015 based on 10X's GemCode™ (or "GEM") technology, a multifaceted and interdisciplinary set of proprietary techniques relating to Gel Beads in Emulsion ("GEMs"). 10X admits that its GemCode™ products can be used with next generation sequencing techniques and can be used to analyze single cells. 10X admits that it launched its Chromium™ product line in 2016 based on 10X's GEM technology. 10X denies any and all remaining allegations and/or legal conclusions set forth in Paragraph 23, and denies that Bio-Rad is entitled to any relief whatsoever.

24. 10X admits that in February 2015, RainDance filed a lawsuit in the District of Delaware accusing 10X's GemCode and Chromium products of infringing several patents. 10X admits that Bio-Rad substituted itself as the Plaintiff in that case. 10X admits that after a November 2018 jury verdict, which included a finding of willful infringement, in August 2018, the Court granted Plaintiffs Bio-Rad and the University of Chicago a permanent injunction. Any execution or enforcement of the judgment is stayed pending completion of any appeal and for thirty days after, and the U.S. Court of Appeals for the Federal Circuit stayed the injunction during the pendency of the appeal to the extent that 10X may continue to sell the Linked-Reads and CNV products subject to the royalty and deposit requirements set forth in Section III of the district court's injunction order. 10X denies the remaining allegations and/or legal conclusions in Paragraph 24.

25. 10X admits that it launched its proprietary Next GEM™ product line in 2019. 10X admits that its proprietary Next GEM™ products include an instrument known as the Chromium Controller and reagent kits for carrying out various genetic analyses, including at least 10X's Chromium Single Cell Gene Expression Solution, Chromium Single Cell Immune Profiling

Solution, and Chromium Single Cell ATAC Solution. 10X admits that Exhibit 2 appears to be a brochure, titled "The Power of Massively Parallel Partitioning." 10X admits that Exhibit 3 appears to be a printout of a webpage, titled "The Next GEM Technology." 10X denies any and all remaining allegations and/or legal conclusions set forth in Paragraph 25, and denies that Bio-Rad is entitled to any relief whatsoever.

26. 10X admits that it launched its IPO on September 12, 2019. 10X admits that Exhibit 4 appears to be a SEC Form S-1 Registration Statement for 10x Genomics, Inc. 10X admits that the Exhibit 4 to the Complaint states, *inter alia*, the words quoted in Paragraph 26. 10X denies any and all remaining allegations and/or legal conclusions set forth in Paragraph 26, and denies that Bio-Rad is entitled to any relief whatsoever.

27. The Court transferred Bio-Rad's claims related to the 115 Patent to the United States District Court for the Northern District of California, and therefore 10X does not respond here to any Bio-Rad allegation in the corresponding paragraph of the Complaint regarding the 115 Patent. ECF No. 99. 10X denies any and all allegations and/or legal conclusions set forth in Paragraph 27 regarding claims related to the 444 and 277 Patents, and denies that Bio-Rad is entitled to any relief whatsoever.

COUNT I

28. 10X repeats and incorporates by reference each of its responses to Paragraphs 1 through 27 above.

29. 10X admits that Exhibit 1 appears to be an uncertified copy of the 444 Patent, titled "In vitro evolution in microfluidic systems," which states on its face that it was issued on October 28, 2014. Except as expressly admitted, 10X denies each and every allegation and/or legal conclusion contained in Paragraph 29 of the Complaint.

30. 10X admits that Andrew David Griffiths, David A. Weitz, Darren R. Link, Keunho Ahn, and Jerome Bibette are listed as inventors on the face of the 444 Patent and that Harvard is listed as an assignee on the face of the 444 Patent. Except as expressly admitted, 10X denies each and every allegation and/or legal conclusion contained in Paragraph 30 of the Complaint.

31. 10X lacks sufficient knowledge or information to form a belief as to the truth or falsity of the allegations set forth in Paragraph 31 and on that basis denies them.

32. 10X states that the document attached as Exhibit 5 is not a signed pleading to which 10X is required to respond, or which is amenable to response. 10X further states that Plaintiffs' demand for a response to something that purports to be a claim chart contravenes Local Rule 16.6(d), and that 10X has responded to Plaintiffs' Local Rule 16.6(d) infringement contentions. To the extent that any response is deemed to be required, 10X denies each and every allegation in Paragraph 32, denies that Exhibit 5 maps each and every claim element to the Next GEM products, and denies any infringement of any valid, enforceable asserted claim of the 444 Patent.

33. 10X admits that the November 2018 jury verdict in the District of Delaware included a finding of willful infringement of certain University of Chicago patents, which 10X is appealing at the U.S. Court of Appeals for the Federal Circuit. 10X admits that it has licensed certain patents from Harvard. Except as expressly admitted, 10X denies each and every allegation and/or legal conclusion contained in Paragraph 33 of the Complaint.

34. 10X admits that Exhibits 10-13 appear to be copies of U.S. Patent Office Information Disclosure Statements, which cite U.S. Patent Application No. 2006/0078888 A1. Except as expressly admitted, 10X denies each and every allegation and/or legal conclusion contained in Paragraph 34 of the Complaint.

35. 10X admits that Exhibit 4 appears to be a copy of a Form S-1 Registration Statement filed with the Securities and Exchange Commission on August 19, 2019. 10X admits that Exhibit 4 states, *inter alia*, the words recited in the quote in Paragraph 35. 10X admits that 10X's Amendment No. 1 to Form S-1 Registration Statement, filed on September 3, 2019, stated on its face that the "Proposed Maximum Aggregate Offering Price" was "$362,250,000." Except as expressly admitted, 10X denies each and every allegation and/or legal conclusion contained in Paragraph 35 of the Complaint.

36. 10X admits that it has had knowledge of the 444 Patent since at least the service of the Complaint in this litigation. Except as expressly admitted, 10X denies each and every allegation and/or legal conclusion contained in Paragraph 36 of the Complaint.

37. 10X denies each and every allegation and/or legal conclusion contained in Paragraph 37 of the Complaint.

38. 10X admits that Exhibit 3 appears to be a printout of a webpage on 10X's website. 10X admits that Exhibit 3 states, *inter alia*, the words recited in the quote in Paragraph 38. Except as expressly admitted, 10X denies each and every allegation and/or legal conclusion contained in Paragraph 38 of the Complaint.

39. 10X denies each and every allegation and/or legal conclusion contained in Paragraph 39 of the Complaint.

40. 10X denies each and every allegation and/or legal conclusion contained in Paragraph 40 of the Complaint.

41. 10X denies each and every allegation and/or legal conclusion contained in Paragraph 41 of the Complaint.

42. 10X denies each and every allegation and/or legal conclusion contained in Paragraph 42 of the Complaint.

43. 10X denies each and every allegation and/or legal conclusion contained in Paragraph 43 of the Complaint.

44. 10X denies each and every allegation and/or legal conclusion contained in Paragraph 44 of the Complaint.

COUNT II

45. 10X repeats and incorporates by reference each of its responses to Paragraphs 1 through 44 above.

46. 10X admits that Exhibit 14 appears to be an uncertified copy of the 277 Patent, titled "In vitro evolution in microfluidic systems," which states on its face that it was issued on March 20, 2018. Except as expressly admitted, 10X denies each and every allegation and/or legal conclusion contained in Paragraph 46 of the Complaint.

47. 10X admits that Andrew David Griffiths, David A. Weitz, Darren Roy Link, Keunho Ahn, and Jerome Bibette are listed as inventors on the face of the 277 Patent and that Harvard is listed as an assignee on the face of the 277 Patent. Except as expressly admitted, 10X denies each and every allegation and/or legal conclusion contained in Paragraph 47 of the Complaint.

48. 10X lacks sufficient knowledge or information to form a belief as to the truth or falsity of the allegations set forth in Paragraph 48 and on that basis denies them.

49. 10X states that the document attached as Exhibit 16 is not a signed pleading to which 10X is required to respond, or which is amenable to response. 10X further states that Plaintiffs' demand for a response to something that purports to be a claim chart contravenes Local Rule 16.6(d) and that 10X has responded to Plaintiffs' Local Rule 16.6(d) infringement contentions.

To the extent that any response is deemed to be required, 10X denies each and every allegation in Paragraph 49, denies that Exhibit 16 maps each and every claim element to the Next GEM products, and denies any infringement of any valid, enforceable asserted claim of the 277 Patent.

50. 10X admits that the November 2018 jury verdict in the District of Delaware included a finding of willful infringement of certain University of Chicago patents, which 10X is appealing at the U.S. Court of Appeals for the Federal Circuit. 10X admits that it has licensed certain patents from Harvard. Except as expressly admitted, 10X denies each and every allegation and/or legal conclusion contained in Paragraph 50 of the Complaint.

51. 10X admits that Exhibit 4 appears to be a copy of a Form S-1 Registration Statement filed with the Securities and Exchange Commission on August 19, 2019. 10X admits that Exhibit 4 states, *inter alia*, the words recited in the quote in Paragraph 51. 10X admits that 10X's Amendment No. 1 to Form S-1 Registration Statement, filed on September 3, 2019, stated on its face that the "Proposed Maximum Aggregate Offering Price" was "$362,250,000." Except as expressly admitted, 10X denies each and every allegation and/or legal conclusion contained in Paragraph 51 of the Complaint.

52. 10X admits that it has had knowledge of the 277 Patent since at least the service of the Complaint in this litigation. Except as expressly admitted, 10X denies each and every allegation and/or legal conclusion contained in Paragraph 52 of the Complaint.

53. 10X denies each and every allegation and/or legal conclusion contained in Paragraph 53 of the Complaint.

54. 10X admits that Exhibit 3 appears to be a printout of a webpage on 10X's website. 10X admits that Exhibit 3 states, *inter alia*, the words recited in the quote in Paragraph 54. Except

as expressly admitted, 10X denies each and every allegation and/or legal conclusion contained in Paragraph 54 of the Complaint.

55. 10X denies each and every allegation and/or legal conclusion contained in Paragraph 55 of the Complaint.

56. 10X denies each and every allegation and/or legal conclusion contained in Paragraph 56 of the Complaint.

57. 10X denies each and every allegation and/or legal conclusion contained in Paragraph 57 of the Complaint.

58. 10X denies each and every allegation and/or legal conclusion contained in Paragraph 58 of the Complaint.

59. 10X denies each and every allegation and/or legal conclusion contained in Paragraph 59 of the Complaint.

60. 10X denies each and every allegation and/or legal conclusion contained in Paragraph 60 of the Complaint.

COUNT III

61. The Court transferred Bio-Rad's claims related to the 115 Patent to the United States District Court for the Northern District of California, and therefore 10X does not respond here to any Bio-Rad allegation in the corresponding paragraph of the Complaint regarding the 115 Patent. ECF No. 99.

62. The Court transferred Bio-Rad's claims related to the 115 Patent to the United States District Court for the Northern District of California, and therefore 10X does not respond here to any Bio-Rad allegation in the corresponding paragraph of the Complaint regarding the 115 Patent. ECF No. 99.

63. The Court transferred Bio-Rad's claims related to the 115 Patent to the United States District Court for the Northern District of California, and therefore 10X does not respond here to any Bio-Rad allegation in the corresponding paragraph of the Complaint regarding the 115 Patent. ECF No. 99.

64. The Court transferred Bio-Rad's claims related to the 115 Patent to the United States District Court for the Northern District of California, and therefore 10X does not respond here to any Bio-Rad allegation in the corresponding paragraph of the Complaint regarding the 115 Patent. ECF No. 99.

65. The Court transferred Bio-Rad's claims related to the 115 Patent to the United States District Court for the Northern District of California, and therefore 10X does not respond here to any Bio-Rad allegation in the corresponding paragraph of the Complaint regarding the 115 Patent. ECF No. 99.

66. The Court transferred Bio-Rad's claims related to the 115 Patent to the United States District Court for the Northern District of California, and therefore 10X does not respond here to any Bio-Rad allegation in the corresponding paragraph of the Complaint regarding the 115 Patent. ECF No. 99.

67. The Court transferred Bio-Rad's claims related to the 115 Patent to the United States District Court for the Northern District of California, and therefore 10X does not respond here to any Bio-Rad allegation in the corresponding paragraph of the Complaint regarding the 115 Patent. ECF No. 99.

68. The Court transferred Bio-Rad's claims related to the 115 Patent to the United States District Court for the Northern District of California, and therefore 10X does not respond

here to any Bio-Rad allegation in the corresponding paragraph of the Complaint regarding the 115 Patent. ECF No. 99.

69. The Court transferred Bio-Rad's claims related to the 115 Patent to the United States District Court for the Northern District of California, and therefore 10X does not respond here to any Bio-Rad allegation in the corresponding paragraph of the Complaint regarding the 115 Patent. ECF No. 99.

70. The Court transferred Bio-Rad's claims related to the 115 Patent to the United States District Court for the Northern District of California, and therefore 10X does not respond here to any Bio-Rad allegation in the corresponding paragraph of the Complaint regarding the 115 Patent. ECF No. 99.

71. The Court transferred Bio-Rad's claims related to the 115 Patent to the United States District Court for the Northern District of California, and therefore 10X does not respond here to any Bio-Rad allegation in the corresponding paragraph of the Complaint regarding the 115 Patent. ECF No. 99.

72. The Court transferred Bio-Rad's claims related to the 115 Patent to the United States District Court for the Northern District of California, and therefore 10X does not respond here to any Bio-Rad allegation in the corresponding paragraph of the Complaint regarding the 115 Patent. ECF No. 99.

73. The Court transferred Bio-Rad's claims related to the 115 Patent to the United States District Court for the Northern District of California, and therefore 10X does not respond here to any Bio-Rad allegation in the corresponding paragraph of the Complaint regarding the 115 Patent. ECF No. 99.

74. The Court transferred Bio-Rad's claims related to the 115 Patent to the United States District Court for the Northern District of California, and therefore 10X does not respond here to any Bio-Rad allegation in the corresponding paragraph of the Complaint regarding the 115 Patent. ECF No. 99.

75. The Court transferred Bio-Rad's claims related to the 115 Patent to the United States District Court for the Northern District of California, and therefore 10X does not respond here to any Bio-Rad allegation in the corresponding paragraph of the Complaint regarding the 115 Patent. ECF No. 99.

76. The Court transferred Bio-Rad's claims related to the 115 Patent to the United States District Court for the Northern District of California, and therefore 10X does not respond here to any Bio-Rad allegation in the corresponding paragraph of the Complaint regarding the 115 Patent. ECF No. 99.

RESPONSE TO PLAINTIFFS' PRAYER FOR RELIEF

Plaintiffs' prayer for relief states legal conclusions to which no response is required, but to the extent that a response is required, 10X denies them and specifically asserts that Plaintiffs are not entitled to any of the relief sought in its prayer for relief against 10X. Plaintiffs' prayer for relief should be denied in its entirety, with prejudice, and Plaintiffs should take nothing.

GENERAL DENIAL AND NON-WAIVER

10X denies each and every allegation contained in the Complaint that is not specifically admitted, denied, or otherwise responded to in this Answer. The failure to deny a specific allegation, or assert a specific defense, shall not be deemed an admission of an allegation or a waiver of a defense.

AFFIRMATIVE AND OTHER DEFENSES

Based on the information presently available to it, or information believed to be available after a reasonable opportunity for further investigation and discovery and without assuming the burden of proof or any other burden it would not otherwise have, 10X asserts the defenses identified below in response to Plaintiffs' allegations of infringement of the 444 and 277 Patents-in-Suit. 10X reserves the right to amend or supplement this Answer with additional defenses as further information is obtained. 10X asserts each of these defenses in the alternative, without admitting that 10X is in any way liable to Plaintiffs, that Plaintiffs have been or will be injured or damaged in any way, or that Plaintiffs are entitled to any relief whatsoever.

FIRST DEFENSE
(Non-Infringement)

77. 10X does not and has not infringed any valid and enforceable claim of the 444 and 277 Patents. At a minimum, the accused products and activities do not include or practice all the limitations of any independent claim of the 444 and 277 Patents.

SECOND DEFENSE
(Invalidity)

78. Each claim of the Asserted Patents is invalid for failure to comply with one or more of the requirements of Title 35 of the United States Code, including, among other sections, Sections 101 *et seq*., including Sections 101, 102, 103, and/or 112, or the Rules and Regulations of the United States Patent & Trademark Office set forth in Title 37 of the Code of Federal Regulations. At least the asserted claims 1, 2, 4 and 8 of the 444 Patent are also invalid because of incorrect inventorship pursuant to §§ 101 and 102(f).

THIRD DEFENSE
(Prosecution History Estoppel and/or Prosecution Disclaimer)

79. On information and belief, Plaintiffs' claims of infringement on the 444 and 277 Patents are barred in whole or in part by the doctrines of prosecution history estoppel and/or prosecution disclaimer because of admissions, amendments, or statements made to the United States Patent and Trademark Office during prosecution of the applications leading to, or related to, the issuance of the 444 and 277 Patents.

FOURTH DEFENSE
(Equitable Defenses)

80. On information and belief, Plaintiffs' claims for relief are barred in whole or in part by laches, consent, waiver, estoppel, acquiescence, and/or implied license.

FIFTH DEFENSE
(License)

81. On information and belief, Plaintiffs' claims for relief are barred in whole or in part by the doctrine of express license.

SIXTH DEFENSE
(No Equitable Relief)

82. On information and belief, Plaintiffs are not entitled to equitable relief with respect to the 444 and 277 Patents under any theory because Plaintiffs have not and will not suffer irreparable harm, are not without adequate remedy at law, the balance of the hardships do not favor entry of an injunction, and/or public policy concerns weigh against any equitable relief.

SEVENTH DEFENSE
(Limitation on Damages and Failure to Provide Notice)

83. Plaintiffs' claim for damages is limited by 35 U.S.C. §§ 286 and 288 and also by 28 U.S.C. § 1498(a). Plaintiffs did not provide notice of its infringement allegations to 10X before filing suit, thus limiting any potential damages in this case. Plaintiffs' claim for damages for

infringement is limited by the damages and/or royalty sought or obtained in the *The University of Chicago v. 10X Genomics*, D. Del. Case No. C.A. 15-152-RGA ("152 Case") (now on appeal) for products found to infringe in the 152 Case. Alternatively, any damages sought in this case must be properly offset to take into account any damages sought or obtained in the 152 Case. 10X states this defense without prejudice to any rights on appeal or in any subsequent proceeding in the 152 Case.

EIGHTH DEFENSE
(Failure to State a Claim)

84. Plaintiffs have failed to state a claim on which relief can be granted.

NINTH DEFENSE
(Failure to Mitigate)

85. Plaintiffs have failed to mitigate damages, if any such damages exist.

TENTH DEFENSE
(Inequitable Conduct)

86. Plaintiffs' claims are barred and the 444 Patent and the 277 Patent are each unenforceable because of inequitable conduct before the United States Patent and Trademark Office ("Patent Office") by the patent applicants, including at least named inventor and co-founder of RainDance Technologies, Darren Link; the named inventor Andrew David Griffiths; the Vice President and head of IP at RainDance, Alan Sherr; their prosecuting attorneys Thomas C. Meyers and Adam Schoen of Brown Rudnick LLP ("Prosecuting Attorneys"); and others involved in the prosecution of these patents (collectively "the Applicants").

87. In the fields of research related to microfluidics, Darren Link thought of himself and Rustem Ismagilov as contemporaries. They were postdoctoral fellows at the same university, with Ismagilov moving on not long before Link arrived.

88. Darren Link knew that while he was looking for ways to manipulate and control microfluidic droplets using electricity, Rustem Ismagilov was at the University of Chicago working on ways to stabilize microfluidic emulsions using biochemically compatible fluorinated surfactants that would keep the emulsions from coalescing and thus allow scientists to perform long-lived biochemical reactions in stable emulsions. There is no doubt—including in the mind of Darren Link—that Darren Link and the other named inventors on the patents-in-suit are not the ones who invented that. According to Darren Link himself, that invention was made by Rustem Ismagilov.

89. In 2004, Darren Link helped found RainDance Technologies, a company that would later be bought by Bio-Rad. The patents asserted in this case are part of the portfolio Bio-Rad purportedly obtained from RainDance.

90. By 2008, RainDance had taken an exclusive license to the core set of Ismagilov's patents from the University of Chicago, patents which Darren Link knew covered what he and/or RainDance claimed was the foundational technology for conducting biochemical reactions in stable emulsions.

91. Then, in the years that followed that license, Darren Link and his company RainDance would assert those exclusively licensed Ismagilov patents against 10X in *The University of Chicago v. 10X Genomics*, in the District Court for the District of Delaware, Case No. C.A. 15-152-RGA ("152 Case"). In the course of that litigation, RainDance, Bio-Rad, their lawyers, and Darren Link himself would characterize Ismagilov's work on biochemical reactions in emulsions stabilized by fluorinated surfactants as foundational, fundamental, and pioneering.

92. During the same years when RainDance was asserting the exclusively licensed Ismagilov patents against 10X, Darren Link together with a group of coinventors and lawyers, continued a campaign they had already begun of passing off what Link knew and understood to be

Ismagilov's inventions to the Patent Office as their own inventions. They falsely claimed to have invented, and repeatedly made false statements that the prior art lacked, the very same inventions they knew the prior art disclosed; such knowledge was evidenced at least by their assertion of the Ismagilov prior art patent against 10X in federal court at the same time.

93. Indeed, in the 152 Case Darren Link gave sworn testimony establishing conclusively his own knowledge and understanding that it was Ismagilov and not himself nor any of his alleged coinventors who had first come up with the Ismagilov inventions. He gave that testimony during the same time period in which the Applicants made a series of statements, representations, and strategic omissions during patent prosecution that were all aimed at getting Link's name and the names of his colleagues onto later-issued, longer-lasting patents that covered inventions Link knew they had never made.

94. Link succeeded. The Patent Office took the Applicants, including Link, at their word and issued patents that claimed inventions Link knew for a fact were not his own even while RainDance and Bio-Rad were pressing forward and making representations in federal court in support of their infringement allegations against 10X based upon the very prior art Ismagilov patent that Link and his team misrepresented. Those patents, the Link patents, that falsely claim as new inventions what Link knew to be Ismagilov's and not his own, are the patents that Bio-Rad has asserted against 10X in this case. They were obtained by a campaign of deliberate deception against the Patent Office and therefore unenforceable.

95. Each of the Applicants, including named inventors and their counsel, has a duty to prosecute patent applications in the Patent Office with candor, disclosure, and good faith. *See* 37 C.F.R. § 1.56. A breach of this duty, including affirmative misrepresentations of material facts or

failure to disclose material information, coupled with an intent to deceive, constitutes inequitable conduct.

96. The Applicants here breached their duty of candor, disclosure and good faith to the Patent Office. The 444 and 277 Patent prosecutions evidence a pattern of inequitable conduct involving deliberate deception of the Patent Office about ***who*** invented the subject matter of the claims and about the ***scope*** and ***content*** of the prior art. It is a pattern in which any single act of inequitable conduct standing alone would render the 444 Patent unenforceable in its entirety. That same pattern applies to the 277 Patent and makes it unenforceable in its entirety as well. Separately and in addition, the inequitable conduct during prosecution of the 444 Patent infects the 277 Patent so that the 277 Patent is also unenforceable in its entirety.

97. The two patents-in-suit, the 444 Patent and the 277 Patent are related and similar. The two patents share the same title "In Vitro Evolution in Microfluidic Systems." They list the same named inventors: Andrew David Griffiths, David A. Weitz, Darren R. Link, Kuenho Ahn, and Jerome Bibette. They were both originally assigned to Medical Research Council and Harvard. Both the application for the 277 Patent and the application for the 444 Patent are intimately related in that they are both continuations of the same applications: (1) patent application No. 11/665,030, filed as application No. PCT/GB2005/003889 on Oct. 10, 2005, now U.S. Pat. No. 9,029,083; and (2) the earlier-in-the-chain application No. 10/961,695, filed on Oct. 8, 2004, now U.S. Pat. No. 7,968,287. The applications from which both patents-in-suit issued were before the same Examiner. The 277 Patent and the 444 Patent share the identical specification, including sharing identical written descriptions with identical figures. They both concern the same subject matter and similar prior art. For example, the only independent claim of the 444 Patent, Claim 1, is very similar to

Claim 1 of the 277 Patent, the only independent claim in that patent. Claim 1 of the 444 Patent reads as follows:

444 Patent
1. A method for detecting a product of an enzymatic reaction, comprising the steps of: providing a droplet generator to produce, under microfluidic control, a plurality of aqueous microcapsules surrounded by an immiscible continuous phase that comprises a fluorinated oil that comprises a fluorinated polymer surfactant, each of the plurality of microcapsules comprising an enzyme, a genetic element, and reagents for the enzymatic reaction; pooling the microcapsules into one or more common compartments such that a portion of the plurality of microcapsules contact each other but do not fuse with each other due to the presence of the surfactant; conducting the enzymatic reaction on the genetic element of at least one of the plurality of microcapsules within the one or more common compartments; and detecting the product of the enzymatic reaction.

Claim 1 of the 277 Patent claims essentially the same subject matter as Claim 1 of the 444 Patent except that it removes the "detecting . . ." limitation from the preamble and the body of the claim and adds the requirement that the genetic element (also claimed in Claim 1 of the 444 Patent) must be "linked covalently or non-covalently to a bead."

98. The sole independent claims from the 277 Patent and 444 Patent, Claims 1 in both, include the identical key limitation "pooling the microcapsules into one or more common compartments such that a portion of the plurality microcapsules contact each other but do not fuse with each other due to the presence of the surfactant." This is the limitation that the Applicants deceptively represented to the Patent Office as the point of novelty to obtain issuance of the 444 Patent. Exhibit R (excerpts of the prosecution history for the 444 Patent) at BIORAD-MA00021222-21228, BIORAD-MA00021267-21288, BIORAD-MA00021289-21304; *see also* Exhibit BB (excerpts of the prosecution history for the 277 Patent) at BIORAD-MA00036467-470,

BIORAD-MA00036489 & BIORAD-MA00036493. In particular, the Applicants represented to the Patent Office, in May/June 2014, that the use fluorinated oil with fluorinated surfactants to stabilize an emulsion so that droplets can be pooled into a common compartment for the purpose of conducting reactions within the droplets of the emulsion without the droplets fusing was ***the crux of their invention*** that was absent and not possible in the prior art and thus its inclusion in the 444 Patent warranted issuance of that patent. This misrepresentation made during prosecution of the 444 Patent as well as a similar misrepresentation made during the prosecution of the parent application to the 277 Patent, also affected the issuance of at least Claim 1 in the 277 Patent and are inequitable conduct acts in the prosecution of that patent as well.

Summary Of Inequitable Conduct Allegations

99. ***First***, Darren Link deliberately withheld material information from the Patent Office when he signed his oath of inventorship but concealed the most critical information: he was not the inventor he claimed to be, and his co-inventors were not either. That is a fact that neither Link nor the others can dispute, as it was the subject of testimony under oath in another legal proceeding, the 152 Case. Link breached his duties of candor, disclosure, and good faith when he signed the oath of inventorship swearing that he was an inventor. He then also actively participated in the prosecution of the claims that were drawn to cover using fluorinated oil with fluorinated surfactants to stabilize an emulsion so that droplets can be pooled into a common compartment for the purpose of conducting reactions within the droplets of the emulsion without the droplets fusing. Link signed that oath and prosecuted those claims even though he knew that neither he nor any of his co-inventors had actually invented the claimed invention because another person, Rustem Ismagilov, had invented the exact same thing many years earlier. Link admitted that knowledge in sworn testimony under oath in a case where Link's then company, RainDance, had asserted its exclusively licensed Ismagilov patents against 10X. Darren Link knew that he was not an inventor

of the 444 Patent. He has given testimony under oath that conclusively establishes this fact. But he told the Patent Office that he was an inventor despite this fact. The claims of the 444 Patent could not have issued without that material misrepresentation. Darren Link deliberately withheld the most material information: neither he nor his named co-inventors were the true inventors. Darren Link's false claims of inventorship were bolstered by additional misleading and obfuscating statements to the Patent Office that are described below, which further confirm his deceptive intent of the false claim of inventorship, and which also constitute separate and distinct acts of inequitable conduct in and of themselves. Darren Link's knowingly false claim of inventorship specifically made for the purpose of procuring a patent to which he had no right constitutes inequitable conduct that renders the 444 Patent unenforceable in its entirety.

100. ***Second***, those involved in the prosecution of the 444 Patent, including Darren Link, Andrew David Griffiths, Thomas C. Meyers, Alan Sherr, and/or others at RainDance or the law firm of Brown Rudnick LLP, knew that key disclosures in the 444 Patent were copied verbatim from an application for a different patent, U.S. Patent No. 9,857,303 ("Griffiths 303"), that they had prosecuted for a different inventive entity. Griffiths 303 disclosed the subject matter of the 444 Patent claims—again, specifically, the use of a fluorinated oil with fluorinated surfactants to stabilize an emulsion and so that droplets can be pooled into a common compartment for the purpose of conducting reactions within the droplets of the emulsion without the droplets fusing. In fact, Griffiths 303 is anticipatory prior art to the 444 Patent and yet significant portions of its specification were copied verbatim into the ultimate parent application that led to the issuance of the 444 Patent. The Applicants even went so far as to characterize the prior art of record during prosecution of the 444 Patent as lacking the very key subject matter that they knew had been copied into the 444 Patent from an application that ultimately led to the prior art Griffiths 303 Patent. The

copied subject matter in fact included the disclosures the Applicants argued to the Patent Office during the prosecution of the 444 Patent were ***the point of novelty*** such that the Patent Office should allow the issuance of the claims of the 444 Patent. But the Applicants failed to disclose that key descriptions of the alleged claimed invention had been taken directly from Griffiths 303, and the failure to disclose this copying is a material omission. But for the Applicants' assertion that the copied subject matter was a novel invention, the 444 Patent claims would not have issued. Applicants' actions constitute a separate act of inequitable conduct in prosecuting the 444 Patent and render that patent unenforceable in its entirety. Furthermore, not only are these acts an independent basis of inequitable conduct, they also served to obfuscate the truth and mislead the Patent Office about the false nature of Darren Link's claim of inventorship as described above.

101. ***Third***, the Applicants buried the highly material prior art of the same prior art inventor, Rustem Ismagilov. Ismagilov was the actual inventor whose invention Darren Link claimed credit for in the application. U.S. Patent No. 7,129,091 ("Ismagilov 091" or "091 Patent") is an anticipatory reference to the 444 Patent. Ismagilov 091 discloses the work by Rustem Ismagilov that Darren Link referred to in his testimony under oath—the testimony where Darren Linked admitted that Rustem Ismagilov was the first to disclose at least Claim 1 of the 444 Patent. Indeed, the 091 Patent specifically discloses what the Applicants repeatedly characterized as the key inventive aspect of their claims. The Applicants disclosed the 091 Patent amid a deluge of other less material prior art; then they misdirected the Patent Office's attention to other aspects of Ismagilov's extensive corpus of prior art by relying on different Ismagilov references to characterize the state of the prior art and the work of Ismagilov, before the time of the alleged invention. But those prior art references Applicants referred to in the body of the specification for the 444 Patent were about an opposite approach to microfluidic droplets—causing them to merge

rather than keeping them separated as the claims of the 444 Patent require—and moreover, using destabilizing rather than stabilizing surfactants, which is contrary to the claims of the 444 Patent and indeed teaches away from those claims. The Applicants did this all the while knowing that Ismagilov had actually invented what they were claiming as the novelty of their invention and, on information and belief, they did so knowing that this same disclosure was present in Ismagilov 091. In this way, the Applicants knowingly misled the Patent Office about the scope and content of the Ismagilov prior art that they had buried in the record and that they knew anticipated their alleged inventions. If the Applicants had not buried Ismagilov 091 and selectively discussed different Ismagilov references, and had they not claimed to have invented what they knew Ismagilov 091 disclosed, the claims of the 444 Patent would not have issued.

102. ***Fourth***, when the Examiner rejected the pending claims, the Applicants distinguished the prior art that was the basis of the rejection, as well as all art of record, by asserting the following:

> ***The prior art did not recognize the need to pool droplets into a common compartment for conducting reactions, nor that it was possible to pool droplets into a common compartment for reactions without the droplets fusing with each other.*** In particular, the prior art does not disclose or suggest using a fluorinated oil and a fluorinated polymer surfactant so that aqueous microcapsules can be pooled into a common compartment for the purpose of conducting a reaction without the aqueous microcapsules fusing.

Exhibit R, BIORAD-MA00021267-BIORAD-MA00021273 at BIORAD-MA00021272 (emphasis added). They knew that the Ismagilov prior art they had buried in the record disclosed the exact thing that they said was the key point of novelty over the prior art. Moreover, they made the representations to the Patent Office although they knew that Darren Link had not invented the claimed method because, according to Link's sworn testimony, Rustem Ismagilov had done so.

103. Without these knowingly false and misleading characterizations of their supposed invention as distinct from the prior art of record, the claims of the 444 Patent would not have issued.

These false and misleading statements made to overcome the Examiner's rejections were yet another instance of inequitable conduct and they render the 444 Patent unenforceable in its entirety. Moreover, these statements provide further confirmation that the prosecution of the 444 Patent was a deliberate and systematic effort to mislead the Patent Office and gain an illegal patent monopoly over subject matter that had never been their own.

104. ***Finally***, claims of the 277 Patent are unenforceable because multiple of the same acts of inequitable conduct were repeated again in the prosecution of that patent by the Applicants: Darren Link signed an oath of inventorship that pertains to the 277 Patent—the same day he signed the oath of inventorship for the 444 Patent, on April 10, 2014. Exhibit R at BIORAD-MA00021243; Exhibit BB at BIORAD-MA00036375. Darren Link's false assertions of inventorship during the prosecution of the 444 Patent were also instrumental in procuring issuance of at least Claim 1 of the 277 Patent. The application for the 277 Patent included the same text copied from the same prior art prosecuted by the same attorneys and during prosecution of the 277 Patent, once again, the Applicants represented to the Patent Office that this was a novel invention despite knowing that it was not. Separately and in addition, as detailed below, the 277 Patent bears an immediate and necessary relation to the 444 Patent. Therefore, the claims of the 277 Patent are likewise unenforceable because of the inequitable conduct perpetrated in the prosecution of the 444 Patent that also infects and renders unenforceable the claims of 277 Patent. But, not only did the Applicants, when prosecuting the later 277 Patent, fail to repudiate any of their prior acts of knowing deception in prosecuting the 444 Patent, they repeated those same deceptive acts again when they prosecuted the 277 Patent.

105. Each of the foregoing acts of inequitable conduct independently renders the claims of the 444 Patent and the 277 Patent unenforceable. Moreover, the repeated and consistent pattern

of knowingly false and misleading statements and misdirection confirm that each of the individual acts described above and described in detail below was taken with the specific intent to deceive the Patent Office into issuing claims that would not have issued but for any of these misleading statements.

Darren Link's False Claim Of Inventorship

106. Darren Link is named as an inventor on the face of the 444 Patent.

107. At every relevant time, including when he was first named as an inventor on the 444 Patent application, when he submitted his oath of inventorship, and when Claim 1 as it was later issued was submitted to the Patent Office, Darren Link knew that neither he nor any of the named inventors actually invented Claim 1.

108. Yet Darren Link signed an oath of inventorship on April 10, 2014, in which he declared that: "I believe that I am the original inventor or an original joint inventor of a claimed invention in the application" Exhibit R (Oath of Inventorship from the file history of the 444 Patent, submitted to Patent Office on May 6, 2014) at BIORAD-MA00021243-244.

109. Soon after Darren Link's oath was submitted to the Patent Office, the Applicants for the 444 Patent, including Darren Link himself, conducted an interview with the Examiner on June 4, 2014. Exhibit R (Applicant Initiated Interview Summary) at BIORAD-MA00021264-266. Following that interview, on June 27, 2014, the Applicants submitted an amendment to the claims that included Claim 1 (then-identified as Claim 108) in substantially the form in which it would ultimately issue. That claim read as follows:

108. (Currently amended) A method ~~of producing a library of entities~~ for detecting a product of an enzymatic reaction, comprising the steps of:

~~producing~~ providing a droplet generator to produce, under microfluidic control, a plurality of aqueous microcapsules surrounded by ~~partitioning an aqueous fluid with two counter propagating streams of~~ an immiscible ~~fluid~~ continuous phase that comprises a fluorinated oil that comprises a fluorinated polymer surfactant, each of the plurality of microcapsules comprising ~~at least one entity of a species~~ an enzyme, a genetic element, and reagents for an enzymatic reaction; ~~and~~

pooling the microcapsules into one or more common compartments such that a portion of the plurality of microcapsules contact each other but do not fuse with each other due to the presence of the surfactant ~~, thereby providing a library of encapsulated entities~~ ;

conducting an enzymatic reaction on the genetic element of at least one of the plurality of microcapsules within the one or more common compartments; and

detecting a product of the enzymatic reaction.

Exhibit R (June 27, 2014, Supplemental Amendment and Response, BIORAD-MA00021267-BIORAD-MA00021273) at BIORAD-MA00021269.

110. Darren Link's duty of candor to the Patent Office applied to Claim 1 and his oath of inventorship was filed with the Patent Office on May 6, 2014. Exhibit R (May 6, 2014, EFS Acknowledgement Receipt) at BIORAD-MA00021235-237.

111. At every relevant time, Darren Link knew for a fact that neither he nor any of the named inventors actually invented Claim 1. That is because Darren Link knew that another person, Rustem Ismagilov, was the inventor of the alleged invention of that claim. In particular, Darren Link believed that Rustem Ismagilov was the one who had discovered that a fluorinated oil with fluorinated surfactants could be used to stabilize an emulsion for the purpose of conducting reactions in the droplets of the emulsion pooled in a common compartment without the droplets fusing or coalescing, along with every other element of Claim 1. The terms fusing and coalescing are used interchangeably in the art. *See, e.g.*, 444 Patent, 33:16-18 (using "fusing" and "coalescing" interchangeably).

112. Darren Link's knowledge that neither he nor any of his named coinventors was an inventor of Claim 1 of the 444 Patent is established by his sworn testimony under oath during a prior patent case against 10X where his company, RainDance, had asserted Rustem Ismagilov's 091 Patent as its exclusive licensee. In that case, *The University of Chicago v. 10X Genomics*, D. Del. Case No. C.A. 15-152-RGA ("152 Case"), Darren Link revealed in sworn testimony that he knew as early as 2001-2002, and thus before the earliest priority date for the applications for the 444 and 277 Patents, which is October 8, 2004, that he did not invent the subject matter of the 444 Patent Claim 1 and his coinventors did not invent it either. Instead, according to Link's own sworn testimony, Rustem Ismagilov had invented it in 2001, which is no fewer than 12 years prior to when Darren Link signed the oath of inventorship in the 444 Patent application. When asked by 10X's counsel, Andrei Iancu, about his knowledge of Ismagilov's work, Darren Link testified as follows:

> Q Okay. At some point did you become aware that Dr. Ismagilov was the first to have done something with droplets in microfluidic devices?
>
> A Yes. Yes.
>
> Q And what is it that you came to believe that he was the first to do?
>
> A *You know,* ***Rustem really,*** *you know,* ***pioneered this use of –*** *you know,* ***these droplet microfluidic devices for doing biological reactions and figured out all of these really important features and elements*** *and – you know,* ***that were necessary to have a complete system that could*** *-you know, that could – that could* ***really work.***
>
> And so it means, you know – I mean, I always told my – when we – later, when I had a team that was working on these sorts of things, I mean, it was a list of things that had to do [sic], and you had to be able to bring all of the components together. You have to be able to get them, you know, into the droplet without reacting before they get into the droplet, but you have to get them into the droplet in the right composition, so if it's a two-component reaction, you have to get both components in there but in the right composition, in the right amount and have that happen, you know, routinely and robustly, but then you also have to make sure that when the droplets are flowing down the channels, that they aren't skinning across the ceiling or skinning across the floor and leaving components behind and, you know, going from one droplet to the – to the next, and you have to have a way of – of, you know – so it's getting the things into the droplets. It's having, you know, good

encapsulation.

Nobody had – that I was aware of – and I don't think anybody before Rustem figured out how to really control keeping the components inside of the droplet so that you don't have things diffusing into the oil or things from the oil diffusing into the reaction and poisoning it, and you don't have things diffusing and moving between droplets, you know, those transport problems.

So you have to have a good encapsulant, but then you also need to – with that good encapsulant, you can't kill the biochemistry. Most of the first systems that we have, you know, tried to work with killed the biochemistry. They killed the enzymes. You can't get the enzymes to work. They won't work inside of the droplet, and a lot of that has to do with the interface. It's controlling the – the chemistry on the interface of the droplet to the oil. And to have a good droplet, you have to control the interface between the oil and the channel.

And so there's – there are all of these elements, but when you're done, ***you want to be able to put all the droplets together into a common compartment where they're touching each other and they don't coalesce. So they have to be stable***, but then you also have to be able to get the stuff back out of them afterwards. At least, if you're doing a DNA application where you want the DNA afterwards, then you have to be able to get the stuff back out.

And it was – I think it was really groundbreaking, you know, at that time, *and, you know,* ***thousands of papers now cite, you know, those first Ismagilov papers where he, you know, put it all together and, you know – you know, provided, you know, this recipe for – I mean that's broad that you can then do all different kinds of biochemical reactions. That was the – you know, one of the really beautiful and powerful things about it, is that once you have all of these tools and all of these elements of the solution, you have a complete solution that's general, and it's general for lots of different chemistries and lots of different bio- -- biochemistry and biochemical reactions.***

Q And Dr. Ismagilov figured all that out?

A Yes. Yes, him and his team. I mean, that was –

Q And when did he do that?

A When he was at Chicago. The exact year, I don't know. Probably, you know, 2001 type of a time frame.

I think we were really contemporary. You know, whereas I was working on these, you know, electrical approaches for manipulating droplets; he was working on and solving all these problems for -for biochemistry*.*

Q And having the droplets being stable so that you can put them together and not coalesce –

A Yeah.

Q – was very important, right?

A That's important, yes.

Q And Dr. Ismagilov figured that out, how to do that?

A So, you know, as I – I didn't go back and look at ***that particular patent*** and all the elements of those first, you know, papers, but***, yes, I mean, he – he – he laid that out as to, you know, the surfactants that stabilized, you know, the droplets.***

Q And he figured that out early [sic, earlier than] you?

A Yes.

Q It's your understanding?

A Yes

Q In around 2001-2002?

A That's my recollection.

Q And without that, it wouldn't work, right, because the whole system – if that doesn't exist, the whole system doesn't work?

A You can – again, all these things depend on the exact application that you're going after, and there are some applications where you don't need the droplets to contact each other, or where you might want just very fast reactions, and those fast reactions don't require the same – the same system, *but* ***to have a system where you have a reaction that requires a long period of time, the best solution is to allow the droplets to contact each other***. They don't have to. You can – there are other solutions that are out there, but, you know, ***that's the solution that I like the best.***

Q In a situation where you have to have the droplets contact each other –

A Yes

Q – it is critically important that the droplets are stable?

A Yes

Q And they don't coalesce?

A Yes.

Q And without that, the system doesn't work?

A That type of a system would not work, yes.

Exhibit S (May 2, 2017 D. Link Deposition in the 152 Case, excerpted) at 38:21-44:5 (emphases added); *see also* 36:10-37:25.

113. Darren Link's testimony shows that Darren Link knew he and his named coinventors did not invent the 444 Patent Claim 1 and establishes his belief before he signed his oath of inventorship and before and while Claim 1 was prosecuted that Rustem Ismagilov was the true inventor. The testimony attributes to Rustem Ismagilov every single element of Claim 1 and the critical act, forming in the mind of the inventor—Ismagilov's mind, not Link's—the complete invention, and in addition, doing the work that Darren Link then learned about and did not invent himself.

114. The below chart maps Link's testimony about Ismagilov's work to every single element of Claim 1, thus showing that Darren Link knew that Ismagilov had invented Claim 1:

444 Claim 1 Limitation	**Darren Link Testimony**
[1.0] "A method for detecting a product of an enzymatic reaction, comprising the steps of:"	Link's testimony shows that he believed that Ismagilov had already shown "detecting the product of the enzymatic reaction": And so there's – there are all of these elements, but when you're done, you want to be able to put all the droplets together into a common compartment where they're touching each other and they don't coalesce. ***So they have to be stable, but then you also have to be able to get the stuff back out of them afterwards. At least, if you're doing a DNA application where you want the DNA afterwards, then you have to be able to get the stuff back out.*** ***And it was – I think it was really groundbreaking, you know, at that time,*** *and, you know,* thousands of papers now cite, you know, those first Ismagilov papers ***where he,*** you know, ***put it all together and,*** you know – you know, ***provided, you know, this recipe for – I mean that's broad that you can then do all different kinds of biochemical reactions. That***

	was the – you know, one of the really beautiful and powerful things about it, is that once you have all of these tools and all of these elements of the solution, you have a complete solution that's general, and it's general for lots of different chemistries and lots of different bio- - - biochemistry and biochemical reactions. ***Q And Dr. Ismagilov figured all that out?*** ***A Yes. Yes, him and his team.*** I mean, that was – Q And when did he do that? ***A When he was at Chicago. The exact year, I don't know. Probably, you know, 2001 type of a time frame.*** *Id*. at 40:25-42:5 (emphasis added). Where Link testified about "you also have to be able to get the stuff back out of them afterwards," and that you "want the DNA afterwards," and in addition the "complete solution that's general," he was admitting that he knew that Ismagilov had invented the system that could obtain and analyze, including detect, the products of those biochemical reactions conducted inside each droplet.
[1.1a] "providing a droplet generator to produce, under microfluidic control, a plurality of aqueous microcapsules surrounded by an immiscible continuous phase"	For example, Link testified: A You know, Rustem really, you know, pioneered this use of – you know, these droplet microfluidic devices for doing biological reactions and figured out all of these really important features and elements and – you know, that were necessary to have a complete system that could – you know, that could – that could really work. Exhibit S at 39:2-8 (emphasis added). Link also testified: Q Okay. At some point did you become aware that ***Dr. Ismagilov was the first to have done something with droplets in microfluidic devices***?

	A Yes. Yes. *Id*. at 38:21-24 (emphasis added). Link also testified: > Nobody had – that I was aware of – and I don't think anybody before Rustem figured out how to really control keeping the components inside of the droplet so that you don't have things diffusing into the oil or things from the oil diffusing into the reaction and poisoning it, and you don't have things diffusing and moving between droplets, you know, those transport problems. > So you have to have a good encapsulant, but then you also need to – with that good encapsulant, you can't kill the biochemistry. Most of the first systems that we have, you know, tried to work with killed the biochemistry. They killed the enzymes. You can't get the enzymes to work. They won't work inside of the droplet, and a lot of that has to do with the interface. It's controlling the – the chemistry on the interface of the droplet to the oil. And to have a good droplet, you have to control the interface between the oil and the channel. *Id*. at 40:5-24. Link's testimony shows that Ismagilov had already used microfluidic devices to generate stable droplets (aqueous microcapsules surrounded by an immiscible continuous phase) and Link regarded Dr. Ismagilov as being the "first to have done something with droplets in microfluidic devices."
[1.1b] "that comprises a fluorinated oil that comprises a fluorinated polymer surfactant,"	*See* limitation 1.1a above. Link's testimony and surrounding circumstances also show that Link knew that Ismagilov's invention included that the droplets "comprise[] a fluorinated oil that comprises a fluorinated polymer surfactant": > They [the enzymes] won't work inside of the droplet, and a lot of that has to do with the interface. It's controlling the – ***the chemistry on***

	the interface of the droplet to the oil. And to have a good droplet, you have to control the interface between the oil and the channel. *Id*. at 40:19-24. A So, you know, as I – I didn't go back and look *at* ***that particular patent*** and all the elements of those first, you know, papers, but***, yes, I mean, he – he – he laid that out as to, you know, the surfactants that stabilized,*** *you know,* ***the droplets.*** *Id*. at 42:18-22 (emphasis added). Link was also well aware of Ismagilov's work on fluorinated surfactants during the relevant period. In addition, at trial in the 152 Case, Bio-Rad specifically elicited testimony from Rustem Ismagilov himself that corroborates the understanding that Ismagilov's early work stabilized droplets, and controlled the interface between the droplet and the surrounding fluid utilizing fluorinated oil with fluorinated surfactants. For example, Bio-Rad's counsel elicited the following testimony from Ismagilov: Q. Were there any important innovations that your team came up with for doing reactions with biological molecules? A. Yes. We -- as I said, it was very important to control this interface. Biological molecules, especially prone to being essentially stuck at these interfaces. So ***we came up with the use of fluorinated fluid, fluorocarbons***. You can call them by many different names. And ***also fluorinated surfactant are those molecules that go at the interface*** and essentially coat it. And they look sort, you know, of far down the side that faces the fluorinated oil, and they provide -- on the other side, they provide polyethylene glycol. They call them OEG moieties, and it's been known in the literature OEG. These OEG moieties actually help if you were to repel biological molecules. But we figured out to put them at that interface,

	and that was really, really helpful. That enabled us to do things with blood, things like crystallization that just wouldn't be easy to do in other ways. Exhibit FF (excerpts of the trial transcript from the 152 Case, including Ismagilov Trial Testimony) at 219:6-24; *see also id.* at 221:12-224:7.
[1.1c] "each of the plurality of microcapsules comprising an enzyme, a genetic element, and reagents for the enzymatic reaction;"	Link's testimony also shows that that he believed that Ismagilov had already invented "each of the plurality of microcapsules comprising an enzyme, a genetic element, and reagents for the enzymatic reaction" and "conducting the enzymatic reaction on the genetic element of at least one of the plurality of microcapsules within the one or more common compartments." In particular, Link testified that Ismagilov figured out how to place DNA from samples, which is a genetic element, into droplets with enzymes, and have the enzymatic reactions performed successfully. That is, Link testified as follows: So you have to have a good encapsulant, but then you also need to – with that good encapsulant, you can't kill the biochemistry. Most of the first systems that we have, you know, tried to work with killed the biochemistry. They killed the ***enzymes***. You can't get the enzymes to work. They won't work inside of the droplet, and a lot of that has to do with the interface. It's controlling the – the chemistry on the interface of the droplet to the oil. And to have a good droplet, you have to control the interface between the oil and the channel. And so there's – there are all of these elements, but when you're done, ***you want to be able to put all the droplets together into a common compartment where they're touching each other and they don't coalesce. So they have to be stable***, but then you also have to be able to get the stuff back out of them afterwards. ***At least, if you're doing a DNA application where you want the DNA afterwards, then you have to be able to get the stuff back out***. ***And it was – I think it was really***

	groundbreaking, you know, at that time, *and, you know,* ***thousands of papers now cite, you know, those first Ismagilov papers where he, you know, put it all together and, you know – you know, provided, you know, this recipe for – I mean that's broad that you can then do all different kinds of biochemical reactions. That was the – you know, one of the really beautiful and powerful things about it, is that once you have all of these tools and all of these elements of the solution, you have a complete solution that's general, and it's general for lots of different chemistries and lots of different bio- - - biochemistry and biochemical reactions.*** ***Q And Dr. Ismagilov figured all that out?*** ***A Yes. Yes, him and his team.*** I mean, that was -- Exhibit S at 40:13-42:1 (emphasis added).
[1.2] "pooling the microcapsules into one or more common compartments such that a portion of the plurality of microcapsules contact each other but do not fuse with each other due to the presence of the surfactant"	Link's testimony shows that he believed that this key limitation—what the Applicants, including Link, had argued during prosecution as the key point of novelty of the claims of the 444 Patent—was in fact invented by someone else because he believed that Ismagilov had been the first to invent it. For example, Link testified: And so there's – there are all of these elements, but when you're done, ***you want to be able to put all the droplets together into a common compartment where they're touching each other and they don't coalesce.*** So they have to be stable, but then you also have to be able to get the stuff back out of them afterwards. *Id*. at 40:25-41:6 (emphasis added). Link also testified: ***Q And having the droplets being stable so that you can put them together and not coalesce –*** A Yeah.

Q – was very important, right?

A That's important, yes.

Q And Dr. Ismagilov figured that out, how to do that?

A So, you know, as I – I didn't go back and look at that particular patent and all the elements of those first, you know, papers, but***, yes, I mean, he – he – he laid that out as to, you know, the surfactants that stabilized, you know, the droplets.***

Q And he figured that out early [sic earlier than] you?

A Yes.

Q It's your understanding?

A Yes

Q In around 2001-2002?

A That's my recollection.

Id. at 42:11-43:3 (emphasis added). Link also continued in his testimony to admit:

Q In a situation where you have to have the droplets contact each other –

A Yes

Q – it is critically important that the droplets are stable?

A Yes

Q And they don't coalesce?

A Yes.

Q And without that, the system doesn't work?

A That type of a system would not work, yes.

	Id. at 43:21-44:5 (emphasis added). Indeed, Link's testimony shows that he believed that Ismagilov had already invented how to use fluorinated oil comprising fluorinated surfactant to pool the droplets together in a common compartment so that they touch but do not coalesce or fuse.
[1.3] "conducting the enzymatic reaction on the genetic element of at least one of the plurality of microcapsules within the one or more common compartments; and,"	Link's testimony also shows that that he believed that Ismagilov had already invented "conducting the enzymatic reaction on the genetic element of at least one of the plurality of microcapsules within the one or more common compartments": So you have to have a good encapsulant, but then you also need to – with that good encapsulant, you can't kill the biochemistry. Most of the first systems that we have, you know, tried to work with killed the biochemistry. They killed the ***enzymes***. You can't get the enzymes to work. They won't work inside of the droplet, and a lot of that has to do with the interface. It's controlling the – the chemistry on the interface of the droplet to the oil. And to have a good droplet, you have to control the interface between the oil and the channel. And so there's – there are all of these elements, but when you're done, ***you want to be able to put all the droplets together into a common compartment where they're touching each other and they don't coalesce. So they have to be stable***, but then you also have to be able to get the stuff back out of them afterwards. ***At least, if you're doing a DNA application where you want the DNA afterwards, then you have to be able to get the stuff back out***. ***And it was – I think it was really groundbreaking, you know, at that time,*** *and, you know,* ***thousands of papers now cite, you know, those first Ismagilov papers where he, you know, put it all together and, you know – you know, provided, you know, this recipe for – I mean that's broad that you can then do all different kinds of biochemical reactions. That was the – you know, one of the really beautiful and powerful things about it, is that once you***

	have all of these tools and all of these elements of the solution, you have a complete solution that's general, and it's general for lots of different chemistries and lots of different bio- - - biochemistry and biochemical reactions. ***Q And Dr. Ismagilov figured all that out?*** ***A Yes. Yes, him and his team.*** I mean, that was – *Id*. at 40:13-42:1 (emphasis added). He also testified that enzymes were being placed into such droplets and that Ismagilov figured out how to place them into droplets and get useful benefit from them. *Id*. Thus, Link knew that Ismagilov had already invented that conducting biochemical reactions involving an enzyme, DNA (a genetic element), and reagents in the droplets that Link and his named coinventors would later claim.
[1.4] "detecting the product of the enzymatic reaction."	Link's testimony shows that he believed that Ismagilov had already shown "detecting the product of the enzymatic reaction": And so there's – there are all of these elements, but when you're done, you want to be able to put all the droplets together into a common compartment where they're touching each other and they don't coalesce. ***So they have to be stable, but then you also have to be able to get the stuff back out of them afterwards. At least, if you're doing a DNA application where you want the DNA afterwards, then you have to be able to get the stuff back out.*** ***And it was – I think it was really groundbreaking, you know, at that time,*** *and, you know,* thousands of papers now cite, you know, those first Ismagilov papers ***where he,*** you know, ***put it all together and,*** you know – you know, ***provided, you know, this recipe for – I mean that's broad that you can then do all different kinds of biochemical reactions. That was the – you know, one of the really beautiful and powerful things about it, is that once you have all of these tools and all of these elements of the solution, you have a complete solution that's general, and it's general for lots of***

	different chemistries and lots of different bio- - - biochemistry and biochemical reactions. ***Q And Dr. Ismagilov figured all that out?*** ***A Yes. Yes, him and his team.*** I mean, that was – Q And when did he do that? ***A When he was at Chicago. The exact year, I don't know. Probably, you know, 2001 type of a time frame.*** *Id*. at 40:25-42:5 (emphasis added). Where Link testified about "you also have to be able to get the stuff back out of them afterwards," and that you "want the DNA afterwards," and in addition the "complete solution that's general," he was admitting that he knew that Ismagilov had invented the system that could obtain and analyze, including detect, the products of those biochemical reactions conducted inside each droplet.

115. Again, Darren Link not only testified that Rustem Ismagilov invented each of the individual elements of Claim 1 of the 444 Patent as detailed above, he expressly testified that Rustem Ismagilov was the one who "***put it all together.***" *Id*. at 41:9-25 (emphasis added).

116. Darren Link's deliberate deception of the Patent Office for the purpose of procuring the issuance of the patent stands on its own, based on the facts described above, but is also further supported by the following facts: Darren Link was co-founder of RainDance, the alleged earlier licensee to the 444 Patent. Pursuant to the RainDance-MRC and RainDance-Harvard license agreements, RainDance and Darren Link controlled the prosecution of the 444 Patent. Exhibit T § 6.1 (DTX-0512.0010) ("RainDance shall at its own expense, be responsible for the worldwide preparation, filing, prosecution and maintenance, at its sole discretion and acting through patent attorneys or agents of its choice, of all patent applications and patents claiming MRC Exclusive Patent Rights and MRC Joint Patent Rights worldwide."); Exhibit U § 3.1 (DTX-0510.0008)

("Licensee recognizes that to date, MRC has been responsible for the preparation, filing, prosecution and maintenance of the Harvard/MRC Patent Rights in consultation with Harvard."). In addition, by 2008, RainDance had licensed Ismagilov 091 from the University of Chicago, and this license was amended in 2013. Exhibits V, W, X. Both the original and amended license list Ismagilov 091 at the top of "SCHEDULE A Licensed Patents." Exhibit W at DTX-0660.0017; Exhibit V at DTX-0659.0007. Link and RainDance also participated in prosecuting the Ismagilov family of patents. *See, e.g.*, *See, e.g.*, Exhibit W at DTX-0660.0008 at Section 6.A and 6.B; Exhibit X at DTX-0665.0002 (2011 Emerald amended license stating: "Six divisional patent applications ***based on US Patent No. 7,129,091*** are expected to be filed in January, 2011. Notwithstanding anything to the contrary herein, LICENSEE shall not be responsible for any costs relating to the preparation and filing of such divisional applications, ***which shall be borne by RainDance Technologies***. Such payments shall not affect LICENSEE's rights to such divisional applications, nor result in RainDance Technologies being granted any rights to such divisional applications in the Field. LICENSEE shall be responsible for fifty percent (50%) of any prosecution costs, foreign filing costs, and other costs incurred subsequent to filing of the divisional applications should LICENSEE elect to retain its license thereto.") (emphasis added). For these and other reasons, Darren Link was very familiar with Ismagilov 091 and its contents.

117. In sum, Darren Link was a purported inventor of the 444 Patent. He signed an oath of inventorship swearing that he was an inventor and he had a duty of candor to the Patent Office. He prosecuted Claim 1 of the 444 Patent. He knew that he was not an inventor of that claim and that his coinventors were not inventors either. His under-oath testimony proves this. Darren Link therefore knew that his sworn oath of inventorship to the Patent Office was false. A false statement that a person invented something that person did not invent is by definition material to patentability.

If Darren Link had told the truth as he knew it, that it was Rustem Ismagilov that invented these claims and not himself and not his coinventors, the 444 Patent in its current form could not and would not have issued. Darren Link intended to deceive the Patent Office by claiming as an "original invention" that which he knew Rustem Ismagilov had invented years before.

118. Moreover, as referenced above and described in detail below, Darren Link's false claims of inventorship were bolstered by additional misleading and obfuscating statements to the Patent Office. For example, when Darren Link and others involved in the prosecution of the 444 Patent presented what would become Claim 1 on June 27, 2014, and filed remarks alleging that the amendments were novel over the prior art, and when Darren Link participated in the Examiner interview on June 4, 2014, concerning the purported novelties of the invention over the prior art, Darren Link still knew that he and his coinventors did not invent Claim 1, but failed to disclose this highly material information to the Patent Office, further evidencing his specific intent to deceive the Patent Office. Each of these acts further confirms the deceptive intent of the false claim of inventorship: he took these actions so that the Patent Office would issue a patent to him and his company that it otherwise would not have issued.

119. The Examiner would have rejected the claims had he been made aware of the improper inventorship during the prosecution of the 444 Patent. Indeed, 35 U.S.C. § 115 requires all patent applications to "include, or be amended to include, the name of the inventor for any invention claimed in the application. Except as otherwise provided in this section, each individual who is the inventor or a joint inventor of a claimed invention in an application for patent shall execute an oath or declaration in connection with the application." In addition, the Manual of Patent Examining Procedure ("MPEP") instructs Examiners to reject applications with improper inventorship. *See* MPEP §2157, "Improper Naming of Inventors" which provides that "the patent laws [] require the naming of the actual inventor or joint inventors of the claimed subject matter."

When the application "does not name the correct inventorship and the applicant has not filed a request to correct inventorship under 37 CFR 1.48, Office personnel ***should reject the claims under 35 U.S.C. 101 and 35 U.S.C. 115.***" (emphasis added).

120. In addition, Darren Link's inventor's declaration to the Patent Office coupled with his knowledge that neither he nor his coinventors had invented Claim 1 was an affirmative act of egregious misconduct because it was the filing of an unmistakably false affidavit, and thus it is material.

121. Darren Link's knowingly false claim of inventorship made for the purpose of procuring a patent to which he had no right constitutes inequitable conduct that renders the 444 Patent unenforceable in its entirety.

Misrepresenting Copied Prior Art As Novel During The Prosecution Of The 444 Patent

122. Those who prosecuted the 444 Patent, including Thomas C. Meyers, Alan Sherr, Andrew David Griffiths, Darren Link, and including others at RainDance or the law firm Brown Rudnick LLP, had earlier filed and prosecuted a different patent—Griffiths 303—for a different inventive entity that disclosed the subject matter of the 444 Patent claims—again, specifically, the use of a fluorinated oil with fluorinated surfactants to stabilize an emulsion and so that droplets can be pooled into a common compartment for the purpose of conducting reactions within the droplets of the emulsion so that the droplets may contact without fusing.

123. Griffiths 303 (Exhibit M) was filed on August 12, 2011, and named Andrew David Griffiths, Chris Abell, Florian Hollfelder, and Enrico Mastrobattista as inventors, a different group of inventors than those named on the face of the 444 Patent. Andrew Griffiths is a named inventor on the Griffiths 303 as well as the asserted 444 and 277 Patents, but he is the only named inventor who appears on all three patents. The application for Griffiths 303 was assigned to or under an obligation of assignment to a different inventive entity than the 444 Patent. The 444 Patent as well

as the 277 Patent were assigned to Harvard ***and*** the Medical Research Counsel ("MRC") and later United Kingdom Research and Innovation ("UKRI"), whereas Griffiths 303 was assigned to MRC alone. The earliest application to which Griffiths 303 claims priority was filed on March 31, 2004. Griffiths 303 is prior art to the 444 and 277 Patents under pre-AIA 35 U.S.C. 102(e).

124. At least Thomas C. Meyers, Alan Sherr, Darren Link, and Andrew David Griffiths were involved in prosecuting Griffiths 303. Thus the same persons who prosecuted the 444 Patent were involved in the prosecution of Griffiths 303. Griffiths 303 expressly disclosed exactly the same subject matter that the 444 Patent claimed as its own novel invention. Indeed, Griffiths 303 discloses each and every element Claim 1 of the 444 Patent as shown in Exhibit HH, and is therefore material prior art.

125. The fact that Griffiths 303 anticipated the 444 Patent Claim 1 was well known to Thomas C. Meyers, Alan Sherr, Darren Link, and Andrew David Griffiths because they were involved in the prosecution of the applications of both patents. *See, e.g.*, Exhibit Y (excerpts of the prosecution history for Griffiths 303) at 170 (identifying "Thomas Meyers," "Alan Sherr," and "Darren Link" as having attended an applicant-initiated interview with the Examiner). Griffiths is a named inventors on both Griffiths 303 and the 444 Patent. The Applicants knew that the specification for the 444 Patent contains copied text from the Griffiths 303 specification, including as shown in Exhibit HH. Moreover, as licensee, RainDance and its lawyers controlled the prosecution of both Griffiths 303 and the 444 Patent, which additionally shows that Thomas C. Meyers, Alan Sherr, and Darren Link knew of the specific contents of the Griffiths 303 specification and how it was copied into the 444 Patent specification. Exhibit T § 6.1 (DTX-0512.0010) ("RainDance shall at its own expense, be responsible for the worldwide preparation, filing, prosecution and maintenance, at its sole discretion and acting through patent attorneys or agents of

its choice, of all patent applications and patents claiming MRC Exclusive Patent Rights and MRC Joint Patent Rights worldwide."); Exhibit U § 3.1 (DTX-0510.0008) ("Licensee recognizes that to date, MRC has been responsible for the preparation, filing, prosecution and maintenance of the Harvard/MRC Patent Rights in consultation with Harvard.").

126. Griffiths 303 anticipates Claim 1 of the 444 Patent. The Applicants knew this. But they chose to pass off what they claimed in the 444 Patent as a novel invention although they knew that it was prior art, and even drafted and submitted proposed claims, claims that are now issued, that were drawn to cover the exact subject matter that they knew had been copied from Griffiths 303. Indeed, not only did they know Griffiths 303 was prior art, they even made affirmative representations to the Patent Office that the subject matter that was copied into the 444 Patent from prior art Griffiths 303 was the very thing that gave the 444 Patent Claim 1 its novelty in Applicants' June 27, 2014, remarks:

> ***The prior art did not recognize the need to pool droplets into a common compartment for conducting reactions, nor that it was possible to pool droplets into a common compartment for reactions without the droplets fusing with each other.*** In particular, **the prior art does not disclose or suggest using a fluorinated oil and a fluorinated polymer surfactant** so that aqueous microcapsules can be pooled into a common compartment for the purpose of conducting a reaction without the aqueous microcapsules fusing.

Exhibit R, BIORAD-MA00021267-273 at BIORAD-MA00021272. (emphasis added).

127. As shown by the above quotation, the Applicants, who knew that the Griffiths 303 expressly disclosed and claimed, and therefore anticipated, Claim 1 of the 444 Patent, nevertheless affirmatively told the Patent Office that the prior art lacked the claimed subject matter whereas that same subject matter had been copied into the 444 Patent from the prior art, Griffiths 303, that the Applicants had prosecuted. For example, the below side-by-side quotations show that to the extent that the specification of the 444 Patent discloses the use of a fluorinated oil and a fluorinate polymer surfactant to that a so that aqueous microcapsules can be pooled into a common compartment for

the purpose of conducting a reaction without the aqueous microcapsules fusing, those same sections were previously disclosed in prior art Griffiths 303 and copied into the specification for 444 Patent.

Griffiths 303	**444 Patent**
Emulsions with a fluorocarbon (or perfluorocarbon) continuous phase (Krafft et al., 2003; Riess, 2002) may be particularly advantageous. For example, stable water-in-perfluorooctyl bromide and water-in-perfluorooctylethane emulsions can be formed using F-alkyl dimorpholinophosphates as surfactants (Sadder et al., 1996). Non-fluorinated compounds are essentially insoluble in fluorocarbons and perfluorocarbons (Curran, 1998; Hildebrand and Cochran, 1949; Hudlicky, 1992; Scott, 1948; Studer et al., 1997) and small drug-like molecules (typically <500 Da and Log P<5) (Lipinski et al., 2001) are compartmentalised very effectively in the aqueous microcapsules of water-in-fluorocarbon and water-in-perfluorocarbon emulsions—with little or no exchange between microcapsules. Griffiths 303 at 12:39-52	Emulsions with a fluorocarbon (or perfluorocarbon) continuous phase (Krafft et al., 2003; Riess, 2002) may be particularly advantageous. For example, stable water-in-perfluorooctyl bromide and water-in-perfluorooctylethane emulsions can be formed using F-alkyl dimorpholinophosphates as surfactants (Sadtler et al., 1996). Non-fluorinated compounds are essentially insoluble in fluorocarbons and perfluorocarbons (Curran, 1998; Hildebrand and Cochran, 1949; Hudlicky, 1992; Scott, 1948; Studer et al., 1997) and small drug-like molecules (typically <500 Da and Log P<5) (Lipinski et al., 2001) are compartmentalised very effectively in the aqueous microcapsules of water-in-fluorocarbon and water-in-perfluorocarbon emulsions—with little or no exchange between microcapsules. 444 Patent at 18:34-47
(II) In a second embodiment, microbeads are analysed ***following pooling of the microcapsules into one or more common compartments***. . . . (III) In a third embodiment, the microbeads are analysed following pooling of the microcapsules into one or more common compartments. Griffiths 303 at 5:60-63, 6:28:30.	(II) In a second embodiment, the genetic elements are sorted ***following pooling of the microcapsules into one or more common compartments***. . . . (III) In a third embodiment, the genetic elements are sorted following pooling of the microcapsules into one or more common compartments. 444 Patent at 6:7-9, 6:26-28

128. If the Applicants had not asserted that the 444 Patent claimed novel subject matter that they knew to have been copied from what he knew was prior art, the 444 Patent claims would not have issued. For example, after considering Applicants' June 27, 2014, remarks, the Examiner

stated in the July 16, 2014 Notice of Allowance that the claims as "novel over the said arts including the arts of the record," which specifically included the art in the IDSs. Exhibit R, BIORAD-MA00021295-21301 at BIORAD-MA00021297. Without their actions in prosecuting an application that comprised copied prior art and passing off the copied prior art as a new invention, which was done with the intent to deceive, the claims would not have issued. Further, their other acts constituting inequitable conduct described above and below are also additional evidence of their specific intent to deceive the Patent Office.

129. Not only are these acts an independent basis of inequitable conduct that renders the 444 Patent unenforceable in its entirety, they also served to obfuscate the truth and mislead the Patent Office about the false nature of Darren Link's claim of inventorship by cloaking it in the seeming legitimacy of a substantive disclosure that was stripped directly from the prior art. Thus, these acts further confirm the inequitable conduct of Link's inventorship oath.

Burying Material Prior Art References And Misdirecting Examiner About Its Nature

130. The Applicants involved in the prosecution of the 444 Patent buried highly material prior art of the same prior art inventor, Rustem Ismagilov, who was also the actual inventor whose invention Darren Link claimed credit for in the application. The Ismagilov 091 Patent is an anticipatory reference and it discloses what Darren Link said under oath Rustem Ismagilov had invented. Indeed, the 091 Patent specifically discloses what the Applicants repeatedly characterized as the key inventive aspect of their claims. Exhibit HH shows that Ismagilov 091 anticipates Claim 1 of the 444 Patent.

131. The Applicants disclosed the 091 Patent by burying it amid nearly 1,500 less material prior art references cited on the face of the 444 Patent. Even though the Applicants disclosed Ismagilov 091 they did so by burying it inside a 103-page IDS and thereby minimizing the chance that the Examiner would focus on that key reference and its anticipatory disclosure.

132. Furthermore, the Applicants misdirected the Patent Office's attention to other aspects of Ismagilov's extensive corpus of prior art by specifically discussing a different Ismagilov reference's disclosure of a different use of microfluidic emulsions that would be inconsistent with and point in the opposite direction of the fluorinated-surfactant-stabilized pooled emulsions for in-droplet reactions that was the subject matter of Claim 1. Indeed, the Ismagilov references that the Applicants discussed did not disclose fluorinated-surfactant-stabilized emulsions, let alone pooling such emulsions for the purpose of conducting reactions in droplets of the emulsions. Rather, these references were exclusively focused on different microfluidic techniques that were inconsistent with and therefore teach ***away*** from the claimed inventions of the 444 Patent.

133. Specifically, the Applicants characterized one Ismagilov reference, not the 091 Patent, as disclosing, a microchannel that is fabricated with "rectangular cross-sections using rapid prototyping in poly(dimethylsiloxane) (PDMS) (McDonald and Whitesides, 2002) and rendered hydrophobic as (Song and Ismagilov, 2003)." 444 Patent, 53:12-15. The Applicants also characterized this Ismagilov reference, not the 091 Patent, as disclosing the following:

> Syringe pumps were used to drive flows (Harvard Apparatus PHD 2000 Infusion pumps). For aqueous solutions, 250 µi Hamilton Gastight syringes (1700 series, TLL) with removeable needles of 27-gauge are used with 30-gauge Teflon tubing (WeiCo Wire and Cable). For the carrier fluid, 1 ml Hamilton Gastight syringes (1700 series, TLL) are used with 30-gauge Teflon needles with one hub from Hamilton (Song and Ismagilov, 2003).

444 Patent, 53:16-23. The article Applicants referenced is Song, H. and Ismagilov, R.F., Millisecond kinetics on a microfluidic chip using nanoliters of reagents, J Am Chem Soc. 125: 14613-14619 (2003). Exhibit Z; 444 Patent at page 17.

134. The Applicants similarly characterized yet another non-091 Ismagilov reference as follows:

> Microcapsules (or droplets; the terms may be used interchangeably [sic] for the purposes envisaged herein) can, advantageously, be fused or split. For example,

> aqueous microdroplets can be merged and split using microfluidics systems (Link et al., 2004; Song et al., 2003). Microcapsule fusion allows the mixing of reagents. Fusion, for example, of a microcapsule containing the genetic element with a microcapsule containing a transcription factor could initiate transcription of the genetic information.
>
> . . . .
>
> The carrier fluid is 9% (v/v) $C_6F_{11}C_2H_4$ OH in perfluorodecaline (PFD) (Song et al., 2003).

444 Patent, 31:59-65, 53:23-25; page 16; Exhibit AA (Song et al., A microfluidic system for controlling reaction networks in time, Angew. Chem. Int. Ed. 42(7):768-772 (2003)).

135. The Applicants focused their attention on the Ismagilov work that focused on the merging of droplets, not keeping the droplets from fusing; and the work that used destabilizing surfactants, not the stabilizing ones. Exhibit AA at 769; Exhibit Z at 8-9. This teaches away from what the Applicants told the Examiner was novel about the claims of the 444 Patent. Exhibit R, BIORAD-MA00021295-1301 at BIORAD-MA00021297.

136. The substantive discussion of different disclosures in different Ismagilov references that taught away from the claimed invention was a backdrop that would ultimately make it unlikely that the anticipatory Ismagilov 091 would ever be seriously considered. Darren Link at least knew that the inventor in question, Ismagilov, had not only disclosed the droplet-merging techniques the Applicants attributed to him in the 444 Patent application, but that Ismagilov had also invented the very thing they were claiming as the novelty of their own supposed invention – including the contact between droplets that did not merge or fuse. Yet he prosecuted his purported claims knowing that they covered the subject matter that he knew Ismagilov had invented and did so leveraging a specification that characterized Ismagilov's work in a manner that teaches away.

137. Additional evidence shows that the Applicants were aware of and would have had knowledge of what Link described as Ismagilov's "groundbreaking work," including their specific

knowledge of the Ismagilov 091 Patent and its anticipatory disclosures. For example, the Ismagilov 091 was licensed by RainDance from the University of Chicago in 2008, in a license that was amended in 2013. Exhibits V, W, X. Both the original and the amended license with the University of Chicago lists the Ismagilov 091 Patent at the top of "SCHEDULE A Licensed Patents." Exhibit W at DTX-0660.0017; Exhibit V at DTX-0659.0007. As co-founder and Vice President of RainDance, Darren R. Link was very familiar with Ismagilov 091 and its contents. As Vice President and head of IP, Alan Sherr would have also had knowledge and awareness of the Ismaglov 091 Patent due to at least the RainDance license with the University of Chicago. For example, Link and RainDance also participated in prosecuting the Ismagilov family of patents. *See, e.g.*, Exhibit W at DTX-0660.0008 at Section 6.A and 6.B; Exhibit X at DTX-0665.0002 (2011 Emerald amended license stating: "Six divisional patent applications ***based on US Patent No. 7,129,091*** are expected to be filed in January, 2011. Notwithstanding anything to the contrary herein, LICENSEE shall not be responsible for any costs relating to the preparation and filing of such divisional applications, ***which shall be borne by RainDance Technologies***. Such payments shall not affect LICENSEE's rights to such divisional applications, nor result in RainDance Technologies being granted any rights to such divisional applications in the Field. LICENSEE shall be responsible for fifty percent (50%) of any prosecution costs, foreign filing costs, and other costs incurred subsequent to filing of the divisional applications should LICENSEE elect to retain its license thereto.") (emphasis added).

138. In addition, RainDance sued 10X for alleged infringement of Ismagilov 091 in the District Court for the District of Delaware in February 2015, and Bio-Rad substituted in after Bio-Rad acquired RainDance. At trial, Bio-Rad specifically elicited testimony from Rustem Ismagilov himself whereby Ismagilov confirmed that his work, and the relevant Ismagilov 091 specification

passages, teach the use of fluorinated surfactants for stabilizing droplets. Exhibit FF (excerpts of the trial transcript from the 152 Case), 221:12-224:7. In addition, in the 152 Case, Bio-Rad's expert Dr. Sia similarly testified that Ismagilov disclosed the use of fluorinated surfactants to prevent coalescence or fusing of droplets. Exhibit FF (excerpts of the trial transcript from the 152 Case), Sia Testimony, 1279:13-1280:3, 1287:18-1289:22 (further describing "long-term stabilization"), 1292:3-13 (biocompatibility of Ismagilov's surfactants), 1254:1-21, 1255:25-1256:8 (describing that Ismagilov's droplets did not coalesce, biocompatibility, and reactions permitted by Ismagilov's surfactants in Examples 10-11, 13, 15); Exhibit A (Ismagilov 091), 68:57-70:47, 71:21-73:32, 74:1-20 (same Examples); *see also, e.g.*, 444 Patent, 33:16-18 (using "fusing" and "coalescing" interchangeably). This testimony further corroborates both the content and materiality of Ismagilov's disclosures.

139. The Applicants characterized Ismagilov's work as being about a different, and indeed the opposite, aspect of microfluidic emulsions and failed to address specifically that Ismagilov disclosed what they knew Ismagilov invented, i.e., the information that was highly material to the claims the Applicants were prosecuting and contradicted their representations to the Patent Office. The Applicants deliberately misled the Patent Office about the scope and content of the Ismagilov prior art that they had buried in the record and that they knew anticipated their alleged inventions. The Applicants had specific intent to deceive the Patent Office. But for the burying of Ismagilov 091 or the Applicants' claim to have invented what they knew Ismagilov 091 disclosed, the claims of the 444 Patent would not have issued.

140. Not only are these acts an independent basis of inequitable conduct, they also served to obfuscate the truth and mislead the Patent Office about the false nature of Darren Link's claim of inventorship as described above. Burying the most pertinent prior art, along with

describing non-pertinent aspects of other references by the same prior artist whom Link testified under oath was the actual inventor, kept the Examiner from realizing the truth that Link did not invent what he claimed to have invented at all. Thus, these acts further confirm the inequitable conduct of Link's inventorship oath.

Material False And Misleading Statements Concerning Prior Art Of Record

141. The Applicants also committed inequitable conduct by deliberately making false and misleading statements about the prior art of record in order to traverse the Examiner's rejections and persuade the Examiner that the claims were novel and patentable when those involved in the prosecution of the 444 Patent, including at least Darren Link, Alan Sherr, Thomas C. Meyers, and Adam Schoen, knew that they were not.

142. When they filed the application from which the 444 Patent issued, on December 4, 2012, Applicants presented Claims 108-120, of which Claim 108 was the sole independent claim:

> 108. (New) A method of producing a library of entities, comprising the steps of:
>
> producing a plurality of microcapsules, each microcapsule comprising at least one entity of a species; and
>
> pooling the microcapsules into one or more common compartments, thereby providing a library of encapsulated entities,
>
> wherein at least one step of the method is performed under microfluidic control.

Exhibit R, BIORAD-MA00010070-BIORAD-MA00010074 at BIORAD-MA00010072-73. Applicants also presented the following dependent Claims 109-120:

109. (New) The method of claim 108, wherein the entities are nucleic acids, proteins, or cells.

110. (New) The method of claim 109, wherein the nucleic acids are primers for a polymerase chain reaction (PCR).

111. (New) The method of claim 108, wherein the entities are labeled.

112. (New) The method of claim 111, wherein the entities are optically labeled.

113. (New) The method of claim 111, wherein the entities are fluorescently labeled antibodies.

114. (New) The method of claim 111, wherein the entities are chemically labeled antibodies.

115. (New) The method of claim 108, wherein the plurality of microcapsules are unable to fuse or coalesce due to the presence of a surfactant.

116. (New) The method of claim 108, wherein the surfactant is a fluorinated surfactant.

117. (New) The method of claim 108, wherein producing comprises forming the microcapsules in carrier fluid.

118. (New) The method of claim 117, wherein the carrier fluid comprises an oil.

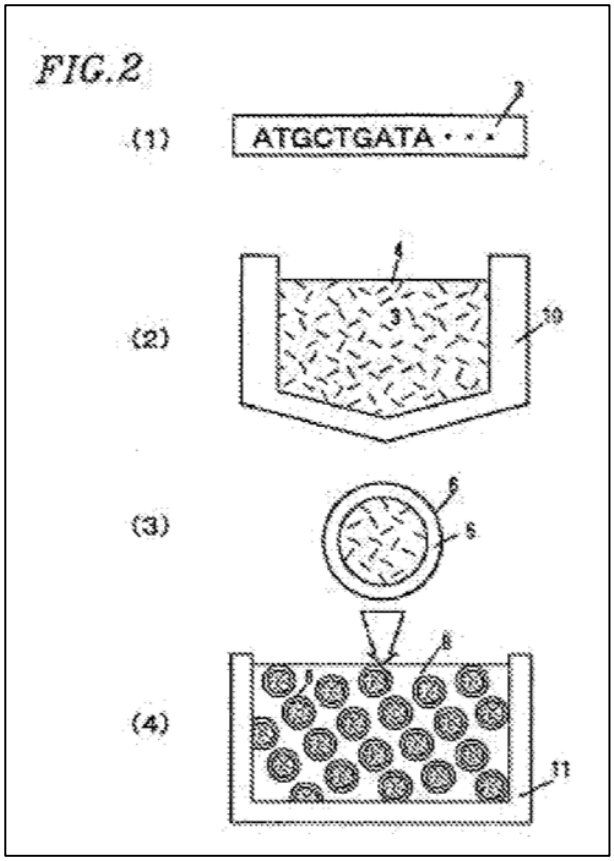
119. (New) The method of claim 118, wherein the oil is a fluorinated or perfluorinated oil.

120. (New) The method of claim 108, wherein the microcapsules are monodisperse with respect to each other.

Id.

143. On December 2, 2013, the Examiner rejected each of the claims under 35 U.S.C. §§ 102 and 103. Exhibit R, BIORAD-MA00021073-BIORAD-MA00021085. In his rejection of claims 108-114 as anticipated (i.e., under § 102), the Examiner interpreted "[t]he step of pooling

the microcapsules into one compartment" "as to encompass collecting the microcapsules into the container or on the substrate . . . ." *Id*. at BIORAD-MA00021075. The Examiner noted that "[t]he steps of claim 108 read on a method of fabricating a plurality of DNA microcapsules in a channel or a tube and pooling them in a container or on a substrate." *Id*. at BIORAD-MA00021076. In rejecting Claim 108, the Examiner found that "***Oshima teaches a method of fabricating a plurality of DNA microcapsules 6 in a capillary tube having a diameter of 30 um and pooling them in a container 11 thereby providing a library of encapsulated entities*** (Figs. 1, 2, 9 and 11, Examples 1 and 2; paragraphs 0106, 0107, 0420, 0486-0493 and 0494-502)." *Id*. at BIORAD-MA00021079-BIORAD-MA00021080 (emphasis added). Examiner also pointed to the following figure in Oshima:



Id. at BIORAD-MA00021076.

144. The Examiner also rejected each of the claims as obvious in light of "Oshima (US 2004/0259083 published Dec. 23, 2004, effective filing date May 10, 2002) in view of Quake et al (US 2002/0058332 published on May 16, 2002, cited in the IDS filed on 3/20/13)." *Id*. at BIORAD-MA00021079. Regarding Claim 108, the Examiner relied upon the same disclosure of Oshima as in the § 102 rejection. Regarding Claims 115 and 116, the Examiner found that while "Oshima teaches the surfactant for carrying out the nucleic acid hybridization reaction (paragraph 0408). Oshima does not specifically teach that microcapsules are unable to fuse due to the presence of a surfactant." *Id*. at BIORAD-MA00021081. The Examiner further found that "Oshima does not specifically teach the fluorinated oil" required by Claim 119. *Id*. The Examiner further found, "[h]owever, the surfactant was known in the art at the time the claimed invention was made as taught by Quake." *Id*. In addition, the Examiner found that:

> Quake teaches a method comprising a plurality of droplets further comprising biological materials, ***wherein the droplets further comprise surfactant and is fluorinated oil*** (paragraph 0117). ***Quake also teaches that surfactant comprises fluorinated oil maintains the drop uniformity*** (paragraph 0117, limitations of claims 115-119). ***One having ordinary skill in the art would recognize that maintaining the uniform size in the presence of surfactant encompass the limitations of droplets (i.e., the microcapsules) are unable to fuse due to the presence of the detergent*** (limitation of claim 115).

Id. (emphasis added). The Examiner also found that "Quake also teaches that the surfactant is for controlling or optimizing the droplet size, flow and uniformity (paragraph 0117), thus providing motivation to include the surfactant of Quake in the method of fabricating microcapsules of Oshima." *Id*. at BIORAD-MA00021081-82. The Examiner found that this combination would have been obvious:

> It would have been prima facie obvious to one of ordinary skill in the art at the time the claimed invention was made to include the surfactant of Quake in the method of fabricating microcapsules of Oshima with a reasonable expectation of success with the expected benefit of controlling or optimizing the droplet size, flow and uniformity as taught by Quake (paragraph 0117). ***An artisan having ordinary skill in the art would have reasonable expectation of success because it merely***

> ***involves including fluorinated surfactant which is routinely practiced in the art as exemplified by Quake.***
>
> It is further noted that in KSR, the Supreme Court particularly emphasized "the need for caution in granting a patent based on the combination of elements found in the prior art," (USPQ2d at 1395), and reaffirmed principles based on its precedent that "[t]he combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results." ***In the instant case, the steps of pending claims comprising producing a plurality of microcapsules using microfluidic system, pooling them are a combination of known steps which are well-understood, routine, conventional activity already engaged in by the scientific community for improving the droplet uniformity, stability and were known in the art at the time the claimed invention was made.*** As discussed above, Oshima in view of Quake teach the steps of pending claims 108-120. Thus the steps of pending claims when viewed as whole, add nothing significant beyond the sum of the steps taken from Oshima in view of Quake. Therefore the steps of instant claims 108-120 are not novel over Oshima in view of Quake.

Id. at BIORAD-MA00021082-83 (emphasis added).

145. After the Examiner rejected the pending claims, the Applicants then, as further described below, distinguished the prior art references that were the basis of the rejection, as well as all art of record. They asserted that the prior art did not disclose, teach, or suggest the use of the fluorinated oil with fluorinated surfactants to stabilize emulsions, which the Applicants characterized in the specification as being the known state of the prior art, for the allegedly novel method of pooling the aqueous microcapsules into a common compartment for the purpose of conducting a reaction without the droplets fusing. Ismagilov was art of record, but the Applicants buried it in a 103-page Information Disclosure Statement. The Applicants knew the full context of the Ismagilov disclosures. Their statements to the Patent Office, in view of the Applicants' knowledge of Ismagilov 091, breached their duty of candor.

146. For example, on June 4, 2014, an interview took place with the Examiner that the Applicants initiated and which Darren R. Link, Alan Sherr, and Adam Schoen attended on behalf of the Applicants. *Id*. at BIORAD-MA00021312-320 at BIORAD-MA00021317; BIORAD-

MA00021264-66 at BIORAD-MA00021265 ("In the interview will be myself (Adam Schoen), ***Inventor Darren Link***, and two of the licensees, Alan Sherr and William McCarthy." The summary sheet filed on June 10, 2014 lists "(3) ***Applicant***: Dr. Link," "Others: Mr. Sherr, and "Representative: Mr. Schoen."). The prior art discussed included "Quake (art of the record) and Mathies (US 2005102875721 and (US 5,401,634)." *Id*. In the interview, "***[t]he applicant*** discussed ***one of the novelties*** of the claimed invention being ***the use of combination of perfluorocarbon carrier fluid and surfactant that allows the generation of high density of microcapsules in contact with each other yet unable to fuse***, which is not realized by either Quake or Mathies." *Id*. (emphasis added). "The examiner suggested to further amending [sic] claim 108 ***incorporating the features that are novel over the art of the record.*** The examiner informed that '634 patent [the Milbrath patent] describes the perfluorocarbon carrier and the surfactant for generating the droplets (i.e., microcapsules)." *Id.* (emphasis added).

147. On June 27, 2014, the Applicant submitted the following remarks indicating how the prior art, including the prior art references Quake, Mathies, and Milbrath raised by the Examiner, did not disclose the use of fluorinated oil and surfactant that allows the pooling of microcapsules in contact with each other yet unable to fuse for the purpose of conducting a reaction in the droplets:

> ***The prior art did not recognize the need to pool droplets into a common compartment for conducting reactions, nor that it was possible to pool droplets into a common compartment for reactions without the droplets fusing with each other.*** In particular, the prior art does not disclose or suggest using a fluorinated oil and a fluorinated polymer surfactant so that aqueous microcapsules can be pooled into a common compartment for the purpose of conducting a reaction without the aqueous microcapsules fusing. . . . ***Additionally, Quake does not disclose or suggest using a continuous phase that includes a fluorinated oil and a fluorinated polymer surfactant so that aqueous microcapsules can be pooled into a common compartment for the purpose of conducting a reaction within the aqueous microcapsules without the aqueous microcapsules fusing***.
>
> Mathies (U.S. patent application number 2005/0287572) ***also does not recognize the need to pool droplets into a common compartment for conducting reactions***, and in fact discloses and suggests the exact opposite. Mathies reports a valve based

> system such that only a single droplet can be acted upon at any time (Mathies, for example at paragraphs [0013], [0015], and [0019]). Mathies' system is specifically designed to ensure that microcapsules are never pooled together. ***Like Quake, Mathies also does not disclose or suggest using a continuous phase that includes a fluorinated oil and a fluorinated polymer surfactant so that aqueous microcapsules can be pooled into a common compartment for the purpose of conducting a reaction within the aqueous microcapsules without the aqueous microcapsules fusing.***
>
> The Examiner has also pointed out Milbrath (U.S. 5,401,634). While Milbrath does report a combination of a fluorinated oil and a fluorinated surfactant, Millbrath reports oil based droplets in an aqueous continuous phase (Milbrath, column 2 lines 55-57). That is the opposite of the claimed methods that use an aqueous microcapsule in an immiscible continuous phase that includes a fluorinated oil comprising a fluorinated surfactant. ***Having the oil as the microcapsules makes it impossible for Milbrath to suggest to the ordinarily skilled artisan that using a continuous phase that includes a fluorinated oil and a fluorinated polymer surfactant would allow for pooling of aqueous microcapsules into a common compartment without the aqueous microcapsules fusing. Therefore, Milbrath does not disclose or suggest the elements of the amended claims, alone or in any combination Quake and/or Mathies.***

Id. at BIORAD-MA00021267-273 at BIORAD-MA00021272-73 (emphasis added).

148. The claims were amended as follows into substantially the form in which they would ultimately issue, including claim 108 (which issued at Claim 1):

> 108. (Currently amended) A method ~~of producing a library of entities~~ for detecting a product of an enzymatic reaction, comprising the steps of:
>
> ~~producing~~ providing a droplet generator to produce, under microfluidic control, a plurality of aqueous microcapsules surrounded by ~~partitioning an aqueous fluid with two counter propagating streams of~~ an immiscible ~~fluid~~ continuous phase that comprises a fluorinated oil that comprises a fluorinated polymer surfactant, each of the plurality of microcapsules comprising ~~at least one entity of a species~~ an enzyme, a genetic element, and reagents for an enzymatic reaction; ~~and~~
>
> pooling the microcapsules into one or more common compartments such that a portion of the plurality of microcapsules contact each other but do not fuse with each other due to the presence of the surfactant ~~, thereby providing a library of encapsulated entities~~ ;
>
> conducting an enzymatic reaction on the genetic element of at least one of the plurality of microcapsules within the one or more common compartments; and
>
> detecting a product of the enzymatic reaction.

Id., BIORAD-MA00021267-273 at BIORAD-MA00021269.

149. On July 16, 2014, the Examiner allowed the claims, stating in the notice of allowance that:

> ***All pending rejections have been withdrawn in view of reaching an agreement on June 27, 2014 that the amendments to independent claim 1 have overcome the rejections over the art of the record including the references cited in the IDSs*** and the new references cited in the IDS and in 892 form. The arguments filed on May 2, 2014 and June 27, 2014 regarding the teachings of Oshima, Quake, Mathies and Milbrath have been fully considered (Remarks, 5/2/14, pgs. 5-7, 6/27/14, pgs. 5-7) and are persuasive. Therefore pending obviousness rejections are withdrawn. The potential obvious rejections over Mathies, Faris, Leamon or Fouillet have been withdrawn in view of reaching ***an agreement that the allowed claims are novel over*** the said arts ***including the arts of the record***.

Id., BIORAD-MA00021289-1301 at BIORAD-MA00021297 (emphasis added). Applicants had previously buried Ismagilov 091 on page 23 of a 103-page IDS.

150. The Applicants made these statements, as is described in the preceding paragraphs, despite knowing that Darren Link was not an inventor and instead that Ismagilov was, and with knowledge that Ismagilov 091 disclosed and anticipated the very thing they were telling the

Examiner the prior art did not have. In particular, as described above, Darren R. Link testified under oath in 152 Case that another scientist, Rustem Ismagilov, had already discovered "a complete solution that's general, ***and it's general for lots of different chemistries and lots of different bio-- biochemistry and biochemical reactions***" including how "***to put all the droplets together into a common compartment where they're touching each other and they don't coalesce***" by 2001-2002 and that there were "surfactants that stabilized, you know, the droplets." Exhibit S (2017-05-02 Link Deposition, excerpted) at 36:10-44:5 (also testifying about Dr. Ismagilov's "powerful" contributions in creating a "complete," "general" solution for different biochemical reactions). Furthermore, the Applicants made these statements, as described in the preceding paragraphs, despite knowing also that another different inventive group had earlier disclosed the same subject matter in Griffiths 303, after Ismagilov and still before the earliest application to which the 444 Patent can claim priority.

151. But for these knowingly false characterizations by the Applicants of their supposed invention as distinct from the prior art of record, the claims of the 444 Patent would not have issued. For example, the prosecution history of the 444 Patent shows that the Examiner was persuaded to allow the claims based on the Applicants' arguments that using a fluorinated oil comprising a fluorinated surfactant to allow microcapsules to pool into a common compartment for the purpose of conducting reactions within the droplets of the emulsion without the droplets fusing was novel and unrecognized in the prior art, including the several prior art references that the Examiner raised. But for the Applicants' arguments including during the June 4, 2014, interview and June 27, 2014, remarks expressing novelty of the purported invention despite having knowledge of Ismagilov's work, Ismagilov 091, and Griffiths 303, the Examiner would not have allowed the claims. Because the Examiner had also found that the dependent claims were known in the art, the Examiner would

not have allowed those claims but for his allowance of the independent claim. *E.g.*, Exhibit R, BIORAD-MA00021073-BIORAD-MA00021085.

152. Moreover, as described in the preceding paragraphs, the Applicants made affirmative statements characterizing the prior art as lacking something they: (1) knew that Darren Link did not invent; (2) knew had been copied from prior art; and (3) knew was expressly disclosed in its entirety by prior art of the real inventor that they had buried in the record and misdirected the Examiner about. All of this provides further confirmation that the prosecution of the 444 Patent was a deliberate and systematic effort to mislead the Patent Office and gain an illegal patent monopoly over subject matter that had never been their own.

153. The Applicants had specific intent to deceive the Patent Office. These false and misleading statements made to overcome the Examiner's rejections were yet another instance of inequitable conduct and they render the 444 Patent unenforceable in its entirety.

154. Not only are these acts an independent basis of inequitable conduct, they also served to obfuscate the truth and mislead the Patent Office about the false nature of Darren Link's claim of inventorship as described above. The statements that the prior art of record did not have the key aspects of Claim 1 that Link claimed to have invented served to obfuscate and conceal the truth that Link did not invent what he said he did. Thus, these acts further confirm the inequitable conduct of Link's inventorship oath.

The 277 Patent Is Also Unenforceable Due To Inequitable Conduct

155. The claims of the 277 Patent are unenforceable because multiple of the same acts of inequitable conduct committed during the prosecution of the 444 Patent were repeated again in the prosecution of the 277 Patent. The Applicants, and on information and belief, individuals acting on behalf of Bio-Rad, had specific intent to deceive the Patent Office. But for the conduct described below, the 277 Patent would not have issued.

156. ***First***, Darren Link signed an oath of inventorship that pertains to the 277 Patent on April 10, 2014—the same day he signed the oath of inventorship for the 444 Patent, on April 10, 2014. Exhibit R at BIORAD-MA00021243-244; Exhibit BB (excerpts of the prosecution history for the 444 Patent) at BIORAD-MA00036375. Darren Link's false assertions of inventorship during the prosecution of the 444 Patent were also instrumental in procuring issuance of at least Claim 1 of the 277 Patent.

157. Claim 1 of the 277 Patent requires:

> 1. A method for conducting an enzymatic reaction, comprising the steps of:
>
> providing a droplet generator to produce, under microfluidic control, a plurality of aqueous microcapsules surrounded by an immiscible continuous phase that comprises a fluorinated oil that comprises a fluorinated polymer surfactant, each of the plurality of microcapsules comprising an enzyme, a genetic element linked covalently or non-covalently to a bead, and reagents for the enzymatic reaction;
>
> pooling the microcapsules into one or more common compartments such that a portion of the plurality of microcapsules contact each other but do not fuse with each other due to the presence of the surfactant; and
>
> conducting the enzymatic reaction on the genetic element of at least one of the plurality of microcapsules within the one or more common compartments.

158. This is essentially the same subject matter as Claim 1 of the 444 Patent except that it removes the "detecting . . ." limitation and adds the requirement that the genetic element (also claimed in Claim 1 of the 444 Patent) must be "linked covalently or non-covalently to a bead."

159. For the same reasons described above, Darren Link knew that neither he nor any of the named inventors had invented the subject matter of Claim 1 of the 444 Patent because that purported invention was made years earlier by Rustem Ismagilov. Yet Darren Link also allowed the prosecution of the application for the 277 Patent to go forward in his name and on his oath. The application for the 277 Patent was filed on May 5, 2017 and proceeded through prosecution even after the 444 Patent issued and after Link testified in the 152 Case. Moreover, the application for

the 277 Patent presented as a new invention the mere slight modification of the purported invention from the 444 Patent that the Applicants, including their lawyers and Darren Link, had previously told the same Examiner was their own but was actually not theirs at all. The 444 Patent and the 277 Patent share the identical specification. In addition, the prosecution history of the 277 Patent shows that its claims are directed to very similar subject matter to that covered by the claims of the 444 Patent. During the prosecution of the 277 Patent, the Examiner requested that the Applicants file a terminal disclaimer to overcome a double patenting rejection over claims of the 444 Patent. Exhibit BB at BIORAD-MA00036443-451. The Applicants did not challenge the Examiner's rejection and filed the terminal disclaimer for the 277 Patent over the 444 Patent. *Id*. at BIORAD-MA00036467-470; BIORAD-MA00036489 & BIORAD-MA00036493 (11/1/17 Terminal Disclaimers); BIORAD-MA00036504-505.

160. Indeed, when prosecuting an earlier application from which the application that issued as the 277 Patent is a continuation, Meyers successfully overcame another prior art rejection by, once again, attributing to Link and the other named inventors the following supposed invention:

> The disclosure relates to single cell analysis within droplets, which are pooled together while preventing cross-contamination between droplets. Being able to pool the droplets while restricting the exchange of materials between them allows reactions to be conducted in high-throughput droplet based detection assays. *See published application, paragraphs [0145]-[0147]*. The claims therefore involve forming droplets in a fluorinated oil comprising a fluorinated polymer surfactant, pooling the droplets, and then performing a reaction so that a change can be detected in the pooled droplets. ***The prior art fails to disclose or suggest forming and pooling droplets in a fluorinated oil comprising a fluorinated polymer surfactant, thereby to prevent the exchange of components between droplets.***

Exhibit CC (excerpts of the prosecution history for U.S. Patent Application Serial No. 15/012,209 ("209 Application"), Applicant Remarks, May 31, 2017) at 5-6 (emphasis added). This was the same subject matter that Darren Link and his named co-inventors with Meyers's assistance asserted as their own in the 444 Patent, and it is again the same invention that Darren Link had by

now testified under oath actually was made by Rustem Ismagilov. And here, they were making the same misrepresentation in a parent application to the 277 Patent, which shares the specification with the application for the 277 Patent.

161. The above argument Meyers made when prosecuting the 209 Application was the same argument the Applicants, including Meyers and Link, made to the same Examiner during the prosecution of the 444 Patent. *See* paragraphs 102, 126, 147 above. Indeed, Meyers submitted the argument to the Patent Office on ***May 31, 2017***. Exhibit CC (excerpts of the prosecution history for the 209 Application, Applicant Remarks, May 31, 2017) at 5-6. And ***less than a month before***, on ***May 2, 2017***, Darren Link had given his deposition testimony under oath that it was really Rustem Ismagilov who had made the invention. *See* paragraphs 112-115 above. The Applicants thus told the same Examiner, yet again, that Darren Link and his co-inventors invented what Rustem Ismagilov really invented. Darren Link himself ***had just testified under oath*** to the opposite. Once again the same Examiner accepted that same representation, stating the following and even quoting the Applicants' misrepresentation:

> The previous rejection of claims 108-127 under pre-AIA 103(a) over Griffiths in view of Quake has been withdrawn in view of persuasive arguments made by the applicant that "There is no disclosure or suggestion in Griffiths [*103, that is different from Griffiths 303*] of using a fluorinated oil with a fluorinated polymer surfactant to allow pooling of the microcapsules without the exchange of material between them."

Exhibit CC (excerpts of the prosecution history for the 209 Application, Final Rejection, August 7, 2017) at 3.

162. The Applicants also committed inequitable conduct by deliberately withholding Darren Link's testimony from the 152 Case. But for their failure to submit that testimony to the Patent Office, the claims of the 277 Patent would not have issued for all the reasons described above with respect to that testimony.

163. In addition, Bio-Rad commissioned a firm called Grant Thornton LLP to conduct a "fair value analysis" of in connection with the RainDance acquisition, as of February 16, 2017. That report, which is dated January 8, 2018, more than two months before the 277 Patent issued, included the following information Bio-Rad's management provided to Grant Thornton: "Management indicated that Bio-Rad's main motivation for acquiring RainDance was to obtain its intellectual property portfolio." Exhibit DD at DTX-1481.0028. The report then details "the primary patent groups obtained from the acquisition" *Id*. As recorded in the "fair value analysis," Bio-Rad management characterized the Harvard/MRC patents, which included the issued 444 Patent and the application for the 277 Patent, as having "[l]argely the same scope as the Chicago patents." *Id.* Thus, Bio-Rad believed and admitted that the MRC/Harvard patents had the same scope as the prior art Chicago patents, which include Ismagilov 091, before the claims of the 277 Patent had issued, and yet on information and belief, individuals acting on Bio-Rad's behalf participated in the prosecution of the 277 Patent and continued to prosecute the 277 Patent despite this knowledge and belief and with the intent to deceive the Patent Office to obtain issuance of the 277 Patent.

164. The prosecution of the 277 Patent thus began from the same false premise that Ismagilov's invention was really Link's and that of the other named inventors and proceeded from there. Thus, Darren Link's false claim of inventorship on the 444 Patent was made to the same Examiner and directly supported the false premise that the 444 Patent named inventors rather than Rustem Ismagilov had invented the use of fluorinated surfactants to stabilize emulsions for the purpose of conducting reactions in the pooled droplets of the emulsions. This false claim of inventorship was material to patentability of the 277 Patent Claim 1 as well. Claim 1 of the 277 Patent broadened Claim 1 of the 444 Patent by removing the "detecting…" limitation and then added one additional limitation—the bead limitation. As explained below in reference to Leamon,

the modification of the broadened version of the 444 Patent Claim, to add the bead limitation of claims of the 277 Patent, was obvious. If the Examiner had known that Link's false claim of inventorship had helped to hide that the core of Claim 1 of the 277 Patent, which was a broader version of Claim 1 of the 444 Patent, was not the Applicants' invention, then the Examiner would not have allowed the trivial, obvious modification of ***someone else's invention*** to issue as Claim 1 of the 277 Patent. Therefore, Link's false claim of inventorship renders the 277 Patent unenforceable in its entirety.

165. As further confirmation that the 277 Patent issued as a result of the same misrepresentation about the origin of the same invention, the same Examiner in the 209 Application specifically said that "[o]ne having ordinary skill in the art would recognize that the subject matter of instant dependent claims 111-127 are not different from claims 1-9 of the '444 patent and over the knowledge in the field of microfluidics and nucleic acid field." Exhibit CC (excerpts of the prosecution history for the 209 Application, Final Rejection, August 7, 2017) at 8. The Examiner made this double patenting rejection over the 444 Patent and invited the Applicants to submit a terminal disclaimer. *Id.* at 5. The Applicants submitted terminal disclaimers. Exhibit CC (excerpts of the prosecution history for the 209 Application, Terminal Disclaimers over the 444 Patent, November 7, 2017).

166. ***Second***, the 277 Patent included in its specification the same copied text from the same prior art, Griffiths 303, that the Applicants involved in the prosecution of the 444 Patent knew of as described in the preceding paragraphs. Nonetheless, they once again told the Patent Office that this was a novel invention while knowing that it was not novel. Exhibit JJ (showing overlap in key anticipatory disclosures between Griffiths 303 and the 277 Patent). Just as with the 444 Patent, the 277 Patent included significant swaths of key disclosures that were copied from Griffiths 303.

The anticipation chart in Exhibit JJ shows the extent of copying of the key disclosures from Griffiths 303 into the specification of the 277 Patent. Yet, the Application passed off the claims of the 277 Patent as a novel invention. This is inequitable conduct for all the same reasons as for the 444 Patent and renders the 277 Patent unenforceable.

167. Indeed, the overlapping material copied into the specification for the 277 Patent included a specific discussion of the use of beads. *See, e.g.*, *Id*. at 23-33 This discloses the bead-related claim limitation that the Applicants added to Claim 1 of the 277 Patent, namely, that the genetic element must be "linked covalently or non-covalently to a bead." Just as every other element of Claim 1 of the 444 Patent, this additional "bead" element of Claim 1 of the 277 Patent, which the Applicants passed off as their own invention, was part of the disclosure that at least the Prosecuting Attorneys for the 444 and 277 Patents knew was actually part of the Griffiths 303 prior art from which it was copied. Griffiths 303 anticipates Claim 1 of the 277 Patent as shown in Exhibit JJ. Had the Applicants not passed off the Griffiths 303 disclosure as their invention in the 277 Patent, at least Claim 1 of the 277 Patent would not have issued. As described above with respect to the 444 Patent, this inequitable conduct also served to obfuscate and conceal the fact that Link's claim of inventorship was false.

168. Indeed, as described above, when prosecuting the 209 Application from which the 277 Patent ultimately issued as a continuation, the Applicants made the above-described arguments specifically to overcome a ***different*** Griffiths reference, U.S. Patent No. 6,489,103 (Griffiths 103). Griffiths 103 specifically lacked the key disclosure that had been copied from Griffiths 303 into the pending 209 Application (as well as the application from which the 277 Patent issued). Exhibit EE (Griffiths 103). In making that argument, as quoted above, the Applicants cited and relied upon paragraphs 145-147 of the publication of the 209 Application. *See* Exhibit CC (excerpts of the

prosecution history for the 209 Application, Applicant Remarks, May 31, 2017) at 5-6. Paragraphs 145 to 147 from the publication of the 209 Application state as follows:

> [0145] Emulsions with a fluorocarbon (or perfluorocarbon) continuous phase (Krafft et al., 2003; Riess, 2002) may be particularly advantageous. For example, stable water-in-perfluorooctyl bromide and water-in-perfluorooctylethane emulsions can be formed using F-alkyl dimorpholinophosphates as surfactants (Sadtler et al., 1996). Non-fluorinated compounds are essentially insoluble in fluorocarbons and perfluorocarbons (Curran, 1998; Hildebrand and Cochran, 1949; Hudlicky, 1992; Scott, 1948; Studer et al., 1997) and small drug-like molecules (typically <500 Da and Log P<5) (Lipinski et al., 2001) are compartmentalised very effectively in the aqueous microcapsules of water-in-fluorocarbon and water-in-perfluorocarbon emulsions--with little or no exchange between microcapsules.
>
> [0146] Creation of an emulsion generally requires the application of mechanical energy to force the phases together. There are a variety of ways of doing this which utilise a variety of mechanical devices, including stirrers (such as magnetic stir-bars, propeller and turbine stirrers, paddle devices and whisks), homogenisers (including rotor-stator homogenisers, high-pressure valve homogenisers and jet homogenisers), colloid mills, ultrasound and 'membrane emulsification' devices (Becher, 1957; Dickinson, 1994), and microfluidic devices (Umbanhowar et al., 2000).
>
> [0147] Complicated biochemical processes, notably gene transcription and translation are also active in aqueous microcapsules formed in water-in-oil emulsions. This has enabled compartmentalisation in water-in-oil emulsions to be used for the selection of genes, which are transcribed and translated in emulsion microcapsules and selected by the binding or catalytic activities of the proteins they encode (Doi and Yanagawa, 1999; Griffiths and Tawfik, 2003; Lee et al., 2002; Sepp et al., 2002; Tawfik and Griffiths, 1998). This was possible because the aqueous microcapsules formed in the emulsion were generally stable with little if any exchange of nucleic acids, proteins, or the products of enzyme catalysed reactions between microcapsules.

Those paragraphs are exactly the same as the key disclosures in the 444 Patent (and the 277 Patent) and are exactly the same in Griffiths 303, and were in fact copied from the application that led to the Griffiths 303 Patent into the applications that led to the 444 Patent and the 277 Patent. Exhibit GG (publication of the 209 Application, paragraphs 145-147); Exhibit M (Griffiths 303 at 12:39-13:6); 444 Patent at 18:34-19:3; 277 Patent at 19:14-50.

169. The Applicants were confronted with a prior art rejection based on a reference by Griffiths, Griffiths 103. They overcame that rejection by relying on a part of their application that they said distinguished the prior art they were rejected over. But what they yet again failed to tell the Examiner was that the particular part of their application that they represented as the crux of their invention had itself been copied from yet another prior art reference that also named Griffiths, Griffiths 303. The Applicants used a supposed invention that was copied from ***one*** Griffiths reference and passed that off as their invention in order to overcome ***another*** Griffiths reference. They ***overcame*** the prior art by relying on a disclosure that was copied ***from*** the prior art.

170. ***Third***, the Applicants' characterizations of the prior art in the prosecution of the 444 Patent also served to persuade the same Examiner to drop a key reference during that prosecution that disclosed key limitations the Applicants would later claim in the 277 Patent. Specifically, as of June 27, 2014, when the Applicants made the representations during prosecution of the 444 Patent, described above in paragraph 147, that the prior art of record did not teach or suggest using fluorinated oil with fluorinated surfactants to stabilize an emulsion so that droplets can be pooled into a common compartment for the purpose of conducting reactions within the droplets of the emulsion without the droplets fusing, this false representation persuaded the Examiner to abandon his pursuit of the Leamon reference. Exhibit R (Notice of Allowability) BIORAD-MA00021289-1304 at BIORAD-MA00021297 ("The potential obvious rejections over Mathies, Faris, ***Leamon*** or Fouillet have been withdrawn in view of reaching an agreement that the allowed claims are novel over the said arts including the arts of the record.) (emphasis added). Leamon published patent application the Examiner referred to issued as the Leamon patent shown in Exhibit K. As described in Exhibits K, KK, Leamon teaches the use of PCR in droplets with beads, which beads satisfy the claim limitation of the 277 Patent's independent Claim 1, which

requires beads to be linked to the genetic element covalently or non-covalently. As further described herein, Ismagilov 091 renders Claim 1 of the 277 Patent invalid as obvious in light of Leamon. Exhibit KK (chart showing that Ismagilov in combination with Leamon renders Claim 1 of the 277 Patent obvious). As further described herein, this is particularly because Ismagilov's disclosure of the specific subject matter the 444 Applicants told the Examiner that the prior art of record lacked what would be combined by a person of skill in the art with the beads disclosed in Leamon to form the purported invention of Claim 1 of the 277 Patent.

171. If the Applicants had not misrepresented the prior art of record by telling the Examiner that it lacked the key subject matter of using fluorinated oil with fluorinated surfactants to stabilize an emulsion so that droplets can be pooled into a common compartment for the purpose of conducting reactions within the droplets of the emulsion without the droplets fusing, then the Examiner would not have ceased potential reliance on Leamon, which he did as a consequence of that same interview. Exhibit R (Notice of Allowability) BIORAD-MA00021289-1304 at BIORAD-MA00021297. Relying expressly on the Applicant's arguments, the Examiner stated: "The potential obvious rejections over Mathies, Faris, Leamon or Fouillet have been withdrawn in view of reaching an agreement that the allowed claims are novel over the said arts including the arts of the record," which expressly included the art in the IDSs. *Id*. Indeed, the additional disclosure of Leamon became irrelevant to the Examiner as a potential combining obviousness reference because the Examiner was persuaded by the Applicants' false statements that the core of the purported invention was missing from the prior art. In short, as a result of the deception, the Examiner would have believed there was nothing material with which to combine Leamon. Had the Applicants not made their false and misleading statements about the art of record and had the Examiner understood what Ismagilov 091 actually disclosed, the Examiner would have known that the combination of Ismagilov 091 and Leamon rendered the subject matter of the 277 Patent Claim 1 unpatentable as obvious over the

combination of Ismagilov 091 and Leamon. The Applicants then successfully prosecuted the 277 Patent before the same Examiner. In that application they successfully claimed the same subject matter that their earlier deception prevented the Examiner from realizing was obvious over the prior art already of record. If not for their false and misleading statements, which were at least aimed at obtaining issuance of the anticipated subject matter of Claim 1 of the 444 Patent, the Examiner would not have allowed Claim 1 of the 277 Patent to issue either.

172. ***Fourth***, the specification of the 444 Patent and the 277 Patent are identical, so the Applicants buried the Ismagilov 091 in the specification of the 277 Patent too, which discussed other non-pertinent Ismagilov art that taught away from the claimed invention, thus concealing the fact that the buried Ismagilov rendered Claim 1 of the 277 Patent obvious. *See* paragraphs 170-171 above.

173. Absent burying the Ismagilov art, and misleading or misdirecting the Examiner to consider Ismagilov as having invented only something that teaches away from the claimed invention, the claims of the 277 Patent would not have issued. This burying and misdirection constitutes inequitable conduct for the same reasons explained above with respect to the 444 Patent given that, as described in the preceding paragraphs, if the Examiner had appreciated the disclosure of Ismagilov 091, the Examiner would not have allowed the claims of the 277 Patent to issue. As described above with respect to the 444 Patent, this inequitable conduct also served to obfuscate and conceal the fact that Link's claim of inventorship was false.

174. ***Fifth***, alternatively, or in addition, the claims of the 277 Patent are likewise unenforceable under the doctrine of infectious unenforceability due to the Applicants', including their lawyers' and at least Darren Link's, inequitable conduct perpetrated in the prosecution of the earlier-issued 444 Patent that also infects and renders unenforceable the claims of the 277 Patent.

But, not only did the Applicants when prosecuting the later 277 Patent fail to repudiate any of their prior acts of knowing deception in prosecuting the 444 Patent, they continued their deception when they prosecuted the 277 Patent.

175. Each of the foregoing acts of inequitable conduct independently renders the claims of the 444 Patent and the 277 Patent unenforceable. Moreover, the repeated and persistent pattern of knowingly false and misleading statements and misdirection confirm that each of the individual acts described above was taken with the specific intent to deceive the Patent Office into issuing claims that would not have issued but for any of these misleading statements.

176. The 277 Patent bears an immediate and necessary relation to the 444 Patent. The 277 Patent is related to 444 Patent. The two patents-in-suit, the 444 Patent and the 277 Patent are related and similar. The two patents share the same title "In Vitro Evolution in Microfluidic Systems." They list the same named inventors: Andrew David Griffiths, David A. Weitz, Darren R. Link, Kuenho Ahn, and Jerome Bibette. They were both originally assigned to Medical Research Council and Harvard. Both the application for the 277 Patent and the application for the 444 Patent are intimately related in that they are both continuations of the same applications: (1) patent application No. 11/665,030, filed as application No. PCT/GB2005/003889 on Oct. 10, 2005, now U.S. Pat. No. 9,029,083; and (2) the earlier-in-the-chain application No. 10/961,695, filed on Oct. 8, 2004, now U.S. Pat. No. 7,968,287. The applications from which both patents-in-suit issued were before the same Examiner. The 277 Patent and the 444 Patent share the identical specification, including sharing identical written descriptions with identical figures.

177. Both patents-in-suit concern the same subject matter and similar prior art. For example, the only independent claim of the 444 Patent, Claim 1, is very similar to Claim 1 of the 277 Patent, the only independent claim in that patent. Claim 1 of the 444 Patent reads as follows:

444 Patent
1. A method for detecting a product of an enzymatic reaction, comprising the steps of: providing a droplet generator to produce, under microfluidic control, a plurality of aqueous microcapsules surrounded by an immiscible continuous phase that comprises a fluorinated oil that comprises a fluorinated polymer surfactant, each of the plurality of microcapsules comprising an enzyme, a genetic element, and reagents for the enzymatic reaction; pooling the microcapsules into one or more common compartments such that a portion of the plurality of microcapsules contact each other but do not fuse with each other due to the presence of the surfactant; conducting the enzymatic reaction on the genetic element of at least one of the plurality of microcapsules within the one or more common compartments; and detecting the product of the enzymatic reaction.

Claim 1 of the 277 Patent claims essentially the same subject matter as Claim 1 of the 444 Patent except that it removes the "detecting . . ." limitation from the preamble and the body of the claim, and adds the requirement that the genetic element (also claimed in Claim 1 of the 444 Patent) must be "linked covalently or non-covalently to a bead."

178. The sole independent claims from the 277 Patent and 444 Patent, Claims 1 in both, include the identical key limitation "pooling the microcapsules into one or more common compartments such that a portion of the plurality microcapsules contact each other but do not fuse with each other due to the presence of the surfactant." This is the limitation that the Applicants, including their lawyers and Darren Link, deceptively represented to the Patent Office as the key point of novelty so as to obtain issuance. Exhibit R at BIORAD-MA00021222-21228, BIORAD-MA00021267-21288, BIORAD-MA00021289-21304; *see also* Exhibit BB at BIORAD-MA00036467-470, BIORAD-MA00036489 & BIORAD-MA00036493. In addition, the prosecution history of the 277 Patent shows that its claims are directed to very similar subject matter to that covered by the claims of the 444 Patent. During the prosecution of the 277 Patent, the

Examiner requested that the Applicants file a terminal disclaimer to overcome a double patenting rejection over claims of the 444 Patent. Exhibit BB at BIORAD-MA00036443-451. The Applicants did not challenge the Examiner's rejection and filed the terminal disclaimer for the 277 Patent over the 444 Patent. *Id*. at BIORAD-MA00036467-470, BIORAD-MA00036487-499, BIORAD-MA00036504-505. This further demonstrates that the claims of the 277 Patent are not sufficiently distinct from those in the 444 Patent.

179. In addition, for the reasons described above, but for the inequitable conduct by the Applicants, the Examiner would not have allowed either the 444 Patent or the 277 Patent.

180. For at least the above-identified reasons, the 277 Patent bears an immediate and necessary relation to the 444 Patent requiring that the earlier inequitable conduct relating to the 444 Patent must be related to the 277 Patent and thus renders the 277 Patent unenforceable as well.

ELEVENTH DEFENSE
(Misuse)

181. The claims of the Asserted Patents are unenforceable for patent misuse, including without limitation because Plaintiffs have attempted to impermissibly broaden or extend the scope of the 444 and 277 Patents with anticompetitive effect based upon Plaintiffs' conduct described generally in 10X's counterclaims, which 10X incorporates by reference as though set forth fully herein.

TWELFTH DEFENSE
(Duplicative Claims)

182. Without admitting that the Complaint states a claim, any remedies Plaintiffs have requested are limited to the extent there is an overlapping or duplicative recovery pursuant to the various claims for any alleged single wrong.

THIRTEENTH DEFENSE
(Judicial Estoppel)

183. Plaintiffs' claims are barred in whole or in part, based on the doctrine of judicial estoppel, to the extent that Bio-Rad makes arguments in this proceeding that are inconsistent with an argument made in a prior or currently pending proceeding, where Bio-Rad has benefited from that argument in the other proceeding.

FOURTEENTH DEFENSE
(Unclean Hands)

184. Plaintiffs' claims are barred by the doctrine of unclean hands, including based upon Plaintiffs' conduct described in 10X's counterclaims and the foregoing affirmative defenses, which 10X incorporates by reference as though set forth in full herein. For example, the broad pattern of inequitable conduct before the Patent Office with respect to the 444 Patent infected the 277 Patent with inequitable conduct. In addition, the withholding of material information and/or the submission of false information to the Patent Office soiled Plaintiffs' hands as to render both the 444 and 277 Patents unenforceable.

ADDITIONAL DEFENSES

185. 10X reserves all affirmative defenses under Rule 8(c) of the Federal Rules of Civil Procedure, the Patent Laws of the United States, and any other defenses at law or in equity that may now exist or in the future be available based on discovery and further factual investigation in this case.

I. ANTITRUST COUNTERCLAIMS

PARTIES

1. 10X is a Delaware corporation with its principal place of business at 6230 Stoneridge Mall Road, Pleasanton, CA 94588.

2. Bio-Rad is a Delaware corporation with its principal place of business at 1000 Alfred Nobel Drive, Hercules, CA 94547.

JURISDICTION AND VENUE

3. The Court has subject matter jurisdiction over these counterclaims under the antitrust laws including Title 15 of the United States Code, as well as 28 U.S.C. §§ 1331, 1337, and 1367.

4. The Court has personal jurisdiction over Bio-Rad for these counterclaims because Bio-Rad has submitted to the jurisdiction of the Court and because Bio-Rad committed acts and/or omissions related to these counterclaims in this District including Bio-Rad's filing of the present lawsuit itself.

5. Venue is proper in this Court under 15 U.S.C. § 22 and 28 U.S.C. § 1391 because Bio-Rad meets the requirements for venue under the foregoing statutes, including because on information and belief Bio-Rad transacts business in the Commonwealth of Massachusetts and a substantial part of the events or omissions giving rise to the counterclaims occurred in Massachusetts. For example, 10X's counterclaims relate in substantial part to Bio-Rad's acquisition of another company, RainDance Technologies, Inc. ("RainDance"), which had its principal place of business in the Commonwealth of Massachusetts.

INTERSTATE COMMERCE

6. The products at issue in 10X's Counterclaims in this action are sold in interstate commerce and Bio-Rad's unlawful activities alleged in these Counterclaims have occurred in, and have a substantial effect upon, interstate commerce.

INTRODUCTION

7. This case relates to two types of life-science research products used for genetic analysis: droplet-digital polymerase chain reaction ("ddPCR") and Next-Generation Sequencing

("NGS") and specifically NGS sample preparation ("NGS Sample Prep"). These products are described in greater detail below at ¶¶ 41-59.

8. 10X is a pioneering innovator in the area of NGS Sample Prep. 10X came to market with groundbreaking products that dramatically improved the ability to study the genes expressed in large numbers of individual cells. 10X's products have enabled previously unfeasible forms of research in the life sciences in areas of critical importance to human health, including cancer, immune disorders, and other serious diseases. Since 10X was founded, it has made tremendous contributions to scientific understanding.

9. Bio-Rad has engaged in actions to monopolize multiple markets, including markets where 10X is an innovating pioneer. Bio-Rad has committed multiple violations of the United States antitrust laws and California unfair competition law. Bio-Rad's violations include an unlawful acquisition and illegal monopolization, monopoly maintenance, and attempted monopolization of markets related to genetic research products and intellectual property. Bio-Rad's unlawful conduct and its use of illegal, anticompetitive, and exclusionary tactics are ongoing. Bio-Rad did not earn its monopoly by developing innovative products of its own or inventing superior technology. Instead, it obtained that power through an illegal, anticompetitive acquisition.

10. In 2017, Bio-Rad acquired RainDance. This acquisition, and Bio-Rad's subsequent use of the RainDance patents, have violated the antitrust laws in several ways. Specifically, Bio-Rad has harmed competition, attempted to monopolize, or monopolized the following markets: (1) the market for droplet digital polymerase chain reaction ("ddPCR") products ("ddPCR Product Market"), (2) the technology market for genetic analysis on a droplet-based platform ("Droplet Genetic Analysis Technology Market"), and (3) the market for droplet-based products that perform single-cell sample preparation for next generation sequencing ("Droplet Single-Cell Product

Market"). Both of the product markets alleged herein are downstream from the Droplet Genetic Analysis Technology Market.

11. First, Bio-Raid has monopolized the ddPCR Product Market through its 2017 acquisition of RainDance. At the time, Bio-Rad was already the dominant firm in the ddPCR product market with, on information and belief, over a 90% share. RainDance was a nascent competitor with, on information and belief, less than a 10% share. The RainDance acquisition thus illegally established or maintained Bio-Rad's monopoly in ddPCR products by eliminating its only real competitor. 10X is a customer that purchases ddPCR products, and has suffered anticompetitive harm from increased prices resulting from Bio-Rad's monopolization of the ddPCR product market.

12. Second, through the RainDance acquisition, Bio-Rad has monopolized or attempted to monopolize the Droplet Genetic Analysis Technology Market. Bio-Rad's acquisition of RainDance's patent portfolio at least substantially lessened competition for the licensing of intellectual property alleged by Bio-Rad to be foundational to droplet-based genetic analysis. Prior to acquiring RainDance, Bio-Rad had already acquired a portfolio of patents that Bio-Rad asserts broadly covers droplet-based genetic analysis. RainDance also held a portfolio of patents that Bio-Rad would later assert as broadly covering the same technology areas. Bio-Rad believed that by acquiring RainDance's patent portfolio it could monopolize the markets for patent licensing that are upstream of the relevant product markets and charge higher royalties for licensing the aggregated patent portfolio. 10X is a customer in the Droplet Genetic Analysis Technology Market.

13. Third, through the RainDance acquisition, Bio-Rad has monopolized or attempted to monopolize the Droplet Single-Cell Product Market. Bio-Rad asserts that its patents, including the patents that it acquired when buying RainDance, cover technology used as inputs for the products in the Droplet Single-Cell Product Market. Bio-Rad offers its own products in the Droplet

Single-Cell Product Market and is attempting to exclude 10X and create a monopoly in this market by refusing to license to 10X the patents it unlawfully acquired and by seeking to enjoin 10X from selling its products. This scheme threatens to significantly reduce competition through the exclusion of Bio-Rad's most significant competitor in the Droplet Single-Cell Product Market.

14. Thus, the acquisition combined two patent portfolios previously held by distinct IP holders, reduced the availability of licenses, increased the would-be price of such licenses, and increased the exclusionary effect of the portfolios by combining them. 10X is a would-be licensee (*i.e.*, a licensing customer) of patents in the Droplet Genetic Analysis Technology Market, which are, according to Bio-Rad's allegations, inputs into 10X's products. Bio-Rad has harmed competition, and 10X has suffered anticompetitive harm, from at least this aspect of the anticompetitive acquisition.

15. Further, Bio-Rad competes in the Droplet Single-Cell Product Market in a way that RainDance did not: While RainDance did not have a product that competed with 10X's single-cell NGS Sample Prep products, at the time when Bio-Rad acquired RainDance, Bio-Rad was releasing its single-cell NGS Sample Prep product. Bio-Rad's product was intended to compete directly with 10X's existing single-cell NGS Sample Prep products. Bio-Rad thus had the incentive to exclude rivals in the Droplet Single-Cell Product Market, and Bio-Rad's acquisition of RainDance's patents gave Bio-Rad increased opportunities to do so. Bio-Rad competes with 10X in the Droplet Single-Cell Product Market, and 10X is a customer of technological inputs for those products (including patent licenses), and thus has suffered anticompetitive harm from this aspect of the acquisition.

16. When Bio-Rad bought RainDance, it announced that it would expand its product offering with the RainDance products. That was not in fact Bio-Rad's intent. Following the acquisition, Bio-Rad terminated RainDance's competing ddPCR product line and curtailed ongoing

research and development efforts for RainDance products. Bio-Rad's purpose in the acquisition was to acquire the patents and use them to maintain or establish monopoly. Since its acquisition of RainDance, Bio-Rad has unlawfully maintained, protected, and expanded its monopoly or market power over the ddPCR Product Market and has sought continually to extend it into adjacent markets, in particular, the Droplet Genetic Analysis Technology Market and Droplet Single-Cell Product Market. Bio-Rad has done so through aggressive litigation (the merits of which 10X disputes) based on its illegally acquired RainDance patents and its illegally aggregated patent portfolio against (1) older generation 10X products and (2) a new generation of 10X products ("Next GEM" products) that use substitute technology specifically designed not to implicate patents that Bio-Rad asserted against 10X prior to the design of Next GEM. Bio-Rad's unlawful acquisition of RainDance has caused harm to 10X, including the harm caused by Bio-Rad's litigation against 10X. Bio-Rad's conduct as a whole is also part of an anticompetitive scheme—including Bio-Rad's unlawful acquisition of RainDance—and the suits Bio-Rad has filed with the wrongly acquired patents are at least part of the way in which Bio-Rad accomplishes its anticompetitive scheme. The suits are also part of how Bio-Rad's anticompetitive acquisition of RainDance harms 10X.

17. BioRad's unlawful conduct has excluded competition, increased prices, and reduced innovation. If left unchecked, Bio-Rad's conduct will continue to reduce the options available to scientists, reduce the quality of the options that remain available, and undermine critical, potentially life-saving scientific research. 10X accordingly asserts these antitrust counterclaims against Bio-Rad.

NATURE OF THE COUNTERCLAIMS

18. We are in the midst of a genomics revolution. This case relates to two distinct technology areas where scientists have made significant strides—ddPCR and NGS. This case concerns both the technology market and the product markets where this technology is used.

19. The first technology area implicated in this case, ddPCR, is a method for determining the quantity of a particular known DNA sequence in genetic material using droplets. ddPCR uses microfluidic chips to divide biological material among numerous tiny droplets, effectively allowing each droplet to be used as though it were a miniature test tube. Each droplet can be checked to determine if it contains the known DNA sequence of interest, thus allowing scientists to calculate the number of DNA molecules with the known sequence in the genetic material.

20. The second technology area implicated in this case is sample preparation for NGS. NGS involves "reading" genetic material. NGS is distinct from ddPCR: whereas ddPCR quantifies the amount of a known sequence in genetic material, NGS is used to read the known or unknown nucleotide sequences in genetic material. NGS Sample Prep involves preparing genetic material for the NGS process. Even though ddPCR and droplet-based single-cell NGS Sample Preparation products are different, both involve the use of microfluidic droplets.

A. Bio-Rad's Acquisition Of RainDance

21. RainDance sold ddPCR products that performed PCR on a droplet-based platform and obtained patents relating to ddPCR. Bio-Rad asserts that these patents also cover 10X's droplet-based NGS Sample Prep products. Years before Bio-Rad bought RainDance, it had already bought another company called QuantaLife, Inc. ("QuantaLife") that developed and sold ddPCR products.

22. If Bio-Rad and RainDance had continued to exist as independent enterprises, they would have competed in multiple ways. First, they would have competed to sell ddPCR products, which in turn would have led to greater innovation, higher quality, and lower prices. Second, they would have competed to license their patents to other companies seeking to sell ddPCR products or droplet-based NGS Sample Prep products. Bio-Rad believed that combining its existing patent portfolio with RainDance's would increase Bio-Rad's negotiating power because it would no longer

be possible for licensees to choose between Bio-Rad and another licensor with the RainDance IP. Bio-Rad regarded RainDance's patents as one of the main reasons justifying the acquisition.

23. Following its acquisition of RainDance, on information and belief, Bio-Rad increased prices for ddPCR products. It also terminated RainDance's competing ddPCR product line and curtailed ongoing research and development efforts for RainDance products, demonstrating that the acquisition was designed to eliminate a nascent competitor and to obtain its intellectual property so that nobody else could use it. Bio-Rad has also used its illegally aggregated patent portfolio to exclude competition from the ddPCR Product Market by refusing to license its patents and by charging supracompetitive royalties.

24. Bio-Rad's exclusionary course of conduct aimed at eliminating competition in the ddPCR Product Market did not stop with its acquisition of RainDance. Bio-Rad has recently targeted Stilla Technologies, Inc. ("Stilla"), a more recent entrant marketing products that are part of the ddPCR Product Market. As of the time of the RainDance acquisition, Stilla was identified as a potential licensee to the RainDance patents, but Bio-Rad now seeks to enjoin Stilla's business.

25. Beyond ddPCR, Bio-Rad's acquisition of RainDance has enabled Bio-Rad's attempted monopolization of the Droplet Single-Cell Product Market. In particular, Bio-Rad is using its illegally aggregated patent portfolio to attempt to eliminate competition.

B. Bio-Rad's Litigation Against 10X

26. 10X is a competitor in the Droplet Single-Cell Product Market.

27. 10X's founders had previously worked at QuantaLife, where they pioneered ddPCR, and for a time worked at Bio-Rad after Bio-Rad bought QuantaLife in 2011. They went on to form the company that became 10X. 10X did not compete with the ddPCR product Bio-Rad had acquired from QuantaLife and, in fact, 10X is a customer of Bio-Rad in the ddPCR Product Market.

Instead, 10X introduced products in the Droplet Single-Cell Product Market where Bio-Rad now competes with 10X.

28. As to NGS Sample Prep, 10X invented, pioneered, and sells revolutionary new products in this field, including but not limited to single-cell NGS Sample Prep (i.e., 10X's products in the Droplet Single-Cell Product Market). 10X's revolutionary advances in this field were hard won through intensive interdisciplinary research, and 10X continues to innovate. 10X's innovative technology provides critical tools for genetic researchers to prepare genetic material for NGS in ways that efficiently obtain information that was previously being lost, including information on individual cells.

29. After 10X released its groundbreaking droplet-based single-cell NGS Sample Prep product line, Bio-Rad attempted to move into that same field and launched a years-long campaign to exclude 10X. Bio-Rad launched its single-cell NGS Sample Prep product, which it calls ddSEQ, around the same time as it bought RainDance. Then, armed with a patent portfolio it aggregated illegally in its unlawful acquisition of RainDance, Bio-Rad engaged in a campaign to exclude competition in the Droplet Single-Cell Product Market.

30. As part of the RainDance acquisition, Bio-Rad took over a lawsuit RainDance had filed against 10X in the District of Delaware (No. 15-cv-152 (D. Del.) ("152 Case")). On information and belief, but for Bio-Rad's illegal acquisition, this litigation was more likely to be resolved with a monetary settlement resulting in a patent license between RainDance and 10X. The terms of this settlement were likely to be more favorable to 10X because the holder of the RainDance IP would have less bargaining power with only those patents than with the combined Bio-Rad and RainDance patent portfolios. Moreover, RainDance and Bio-Rad had different incentives. RainDance had only a limited presence in the product market for ddPCR products (a

market in which 10X did not compete in any case) and no product that competed with 10X in single-cell NGS Sample Prep. Thus, RainDance had stronger competitive incentives to agree to competitive licensing terms with companies making single-cell NGS Sample Prep products, such as 10X. RainDance would not have been able rely on the same evidence of competition in the product market that Bio-Rad ultimately relied upon to obtain an injunction order (currently on appeal) against 10X's products; and RainDance would not have been able to obtain such an injunction.

31. Subsequently, Bio-Rad brought a series of additional lawsuits against 10X's products to monopolize the Droplet Single-Cell Product Market. These actions, like Bio-Rad's acquisition of the RainDance patents, were taken with the specific intent to monopolize and there is a dangerous probability that Bio-Rad will monopolize this market if left unchecked.

32. In Mid-2017, following its acquisition of RainDance, Bio-Rad filed a complaint with the United States International Trade Commission (the "ITC"), accusing microfluidic chips in 10X's products of infringing multiple patents that issued from alleged rights that were part of Bio-Rad's portfolio of patents from before the RainDance acquisition. The Commission instituted International Trade Commission Investigation No. 337-TA-1068 (the "1068 Investigation"). In the 1068 Investigation, Bio-Rad sought to exclude from U.S. importation the microfluidic chips then-used in 10X's droplet single-cell products. Bio-Rad also sought to exclude from U.S. importation the microfluidic chips that 10X uses internally to manufacture the gel beads that are used in its NGS Sample Prep products. The Commission's limited exclusion order excludes only the microfluidic chips used in 10X's historical products. The Commission found that the microfluidic chips used in Next GEM design NGS Sample Prep products and 10X's process for manufacturing the gel beads do not infringe the patents asserted in the 1068 Investigation. The Commission's limited exclusion

order does not exclude the importation of the microfluidic chips used in 10X's current Next GEM design NGS Sample Prep products. The microfluidic chips in 10X's Next GEM products were designed specifically not to implicate any of the Bio-Rad / RainDance patents that Bio-Rad had previously asserted. The Commission's limited exclusion order likewise does not exclude the importation of chips for 10X's process for manufacturing the gel beads that are used in its NGS Sample Prep Products.

33. Bio-Rad filed two additional lawsuits in the District of Delaware, Case No. 19-cv-1699 (the "1699 Case"), which Bio-Rad subsequently dismissed and refiled as the present case in this Court, as well as Case No. 1:18-01679-RGA (the "1679 Case"), which is currently pending in Delaware. In both of these lawsuits, Bio-Rad has asserted additional patents, including patents it obtained through the RainDance acquisition. In both of these lawsuits, Bio-Rad asserts that 10X's newly designed, current Next GEM products, are infringing. With 10X's motions to dismiss and transfer pending before the District of Delaware, Bio-Rad preemptively dismissed the 1699 Case and refiled as the present case in this Court in an attempt to forum shop its case on the 115 Patent that Bio-Rad knew 10X contended belonged in the Northern District of California.

34. When Bio-Rad filed the 1699 Case in Delaware it also issued a press release stating that the lawsuit asserted infringement by 10X's newly designed Next GEM products. In that press release, Bio-Rad stated that it would seek injunctive relief against 10X. Bio-Rad took these actions on September 11, 2019, which was the day before 10X's scheduled initial public offering ("IPO"). Bio-Rad's original complaint was carefully timed, having been filed at 3:36 PM, to precede the expected time of 10X's call with the Securities and Exchange Commission to go "effective"—a required step prior to pricing (and trading) an IPO. These SEC calls are regularly scheduled at 4

PM the day before an IPO. Bio-Rad was attempting to use the court filing and Bio-Rad's related press release to disrupt 10X's IPO.

35. Following the Commission's issuance of the Final Determination and remedial orders in the 1068 Investigation, Bio-Rad issued another press release, announcing that it accuses 10X's Next GEM products of infringement in both the 1679 Case and the present case.

36. Bio-Rad has used illegally acquired assets to drive up 10X's costs, and it has cast false aspersions on 10X's reputation in an effort to undermine customer and investor confidence, as well as to tie up the time and attention of many of 10X's key personnel over a period of years. Bio-Rad did all of this to try to eliminate competition and dominate the Droplet Single-Cell Product Market. The cost to 10X of this anticompetitive interference from Bio-Rad's litigation using its illegally acquired assets has been very high, especially relative to 10X's size and revenue.

C. Bio-Rad's Antitrust Violations

37. Bio-Rad's conduct and Bio-Rad's use of the illegally acquired RainDance patents have caused significant harm to competition and antitrust injury to 10X: ***First***, in the ddPCR Product Market, 10X must—like other ddPCR customers—pay supracompetitive prices for ddPCR products because of Bio-Rad's monopolization. ***Second***, in the Droplet Genetic Analysis Technology Market, 10X—like other potential downstream IP licensees—either cannot obtain licenses or must pay supracompetitive prices for those licenses because Bio-Rad's acquisition of RainDance was an anticompetitive combination of two patent portfolios that would otherwise have been held by competing licensors. ***Third***, 10X—like any other potential participants in the Droplet Single-Cell Product Market—is not able to license Bio-Rad's patents without paying supracompetitive royalties, if at all, because Bio-Rad's acquisition of RainDance was an anticompetitive merger. Because Bio-Rad competed in the downstream product markets, the

merger gave Bio-Rad the ability and incentive to exclude rivals in the Droplet Single-Cell Product Market by denying them inputs to those products.

38. Bio-Rad's conduct violates the antitrust laws as follows:

- Bio-Rad's unlawful acquisition of RainDance violated Section 7 of the Clayton Act, 15 U.S.C. § 18, because it substantially lessened competition and tended to create monopoly in the Droplet Single-Cell Product Market, in the ddPCR Product Market, and in the Droplet Genetic Analysis Technology Market.
- Bio-Rad's unlawful acquisition of RainDance and Bio-Rad's subsequent use of its unlawfully aggregated patent portfolio in litigation violate Section 2 of the Sherman Act, 15 U.S.C. § 2, and are acts of monopolization and/or attempted monopolization of the Droplet Genetic Analysis Technology Market.
- Bio-Rad's unlawful acquisition of RainDance and Bio-Rad's subsequent use of its unlawfully aggregated patent portfolio in litigation violate Section 2 of the Sherman Act and are acts of attempted monopolization of the Droplet Single-Cell Product Market.
- Bio-Rad's unlawful acquisition of RainDance violates Section 2 of the Sherman Act, 15 U.S.C. § 2, and are acts of monopolization and/or attempted monopolization of the ddPCR Product Market.
- Bio-Rad's conduct as alleged herein also constitutes unfair competition under § 17200 et seq. of the California Business and Professions Code.

39. Only injunctive relief can fully remedy the anticompetitive harm. Bio-Rad must be ordered to divest the RainDance patents and the licenses acquired through the RainDance acquisition to a third party that will have the incentive to license the patents at competitive rates

and that will not have the incentive to foreclose competitors in the Droplet Single-Cell Product Market. Only such a divestiture will remedy the harm Bio-Rad has caused to competition in the Droplet Genetic Analysis Technology Market, the ddPCR Product Market, and the Droplet Single-Cell Product Market.

40. 10X also seeks damages for Bio-Rad's unlawful conduct. First, 10X is entitled to damages for the excessive prices it has paid for ddPCR products. Second, 10X has suffered substantial damages from its inability to license on competitive terms the patents now owned by Bio-Rad in the Droplet Genetic Analysis Technology Market. These damages include lost profits and business opportunities. 10X has also suffered substantial damages as the result of Bio-Rad's litigation tactics using the illegally acquired patents. These costs include not only legal fees, but also lost profits and business opportunities as well as reputational harm.

THE GENETICS RESEARCH TOOLS INDUSTRY

41. Researchers in the life sciences need tools, such as DNA sequencers, to do their work. The provision of such tools is big business: in 2017, life-science researchers spent more than $50 billion on research tools. These researchers are spread across the health ecosystem in non-profit research centers (such as universities and government entities), pharmaceutical companies, and applied science entities (such as clinical laboratories and hospitals).

42. The research tools industry spans multiple fields in life science, including, among others, genomics, proteomics, and cell biology. Because these fields are characterized by rapid innovation, companies in the research tools industry often license patents to access the technology they need or might be alleged to need in order to develop and sell their products.

43. The products and technologies at issue in this case are among those involved in genetic analysis, and in particular those used (i) to accurately quantify the amount of a known DNA

sequence in genetic material using PCR; and (ii) to "read" many known or unknown DNA sequences in genetic material using NGS.

A. Background: Genetic Material

44. DNA contains the hereditary material for living organisms, encoded as a series of particular molecules called nucleotides (or "bases"). DNA is made up of four different nucleotide types that are linked together into two strands that bind each other and together form a double helix. Each nucleotide always bonds with the same complementary partner on the opposite strand (forming "base pairs"), so knowing the sequence of nucleotides on one side of the double helix is sufficient to provide the full sequence of nucleotides for the other side of the double helix.

45. In cells, a strand of DNA is copied to make a strand of RNA containing the complementary sequence. The sequence of nucleotides in RNA is used to make proteins through a process called "translation," and those proteins do much of the work in the cell. The sequence of base pairs is a code that dictates functions of life. The DNA genome will contain the common code that is used throughout the organism. The collection of RNA molecules in a cell corresponds to the specific proteins made in that cell.

B. ddPCR—Accurately Quantifying Known DNA Sequences

46. Techniques were developed to achieve the goal of providing an accurate quantification of a specific, known sequence of DNA in some given genetic material. Common techniques for this rely on the polymerase chain reaction ("PCR"). PCR is a biological method that uses a repeating cycle of steps to make exponential numbers of copies of DNA. PCR involves heating and cooling the DNA repeatedly in a device called a thermal cycler. By using PCR in combination with detection techniques scientists can tell whether a sequence is present in some genetic material.

47. More advanced techniques use PCR to tell not just whether a sequence of DNA or RNA is present, but also to estimate how many instances of that sequence are present in some genetic material. One such technique is called real-time PCR. This method involves running PCR and measuring the amount of DNA after each heating/cooling cycle. Scientist can use the collected data to estimate the relative initial amount of DNA in the genetic material.

48. Another technique for determining the amount of DNA in the genetic material is digital PCR ("dPCR"). This technique involves dividing a solution containing DNA into many sub-units and then running PCR reactions on the sub-units. Some sub-units will react and others will not. The fact that each sub-unit is either reactive or not for a given sequence is what gives this technique the name "digital." Counting the number of reactive sub-units allows scientists to calculate the number of nucleic acid molecules with a given sequence in genetic material.

49. QuantaLife, which was acquired by Bio-Rad, used microfluidic droplets as the sub-units for dPCR. QuantaLife's ddPCR products included "consumables" (such as microfluidic chips and reagents) that are used once as well as dedicated bench-top devices used with those consumables to create and collect data from the droplets. The products divided a water-based solution containing DNA into many microscopic water droplets suspended in oil (a "water-in-oil emulsion"). Each droplet also contains the reagents necessary to run a PCR reaction. The droplets are formed in a device called a droplet generator. The emulsion with the droplets is then transferred to a thermal cycler (a standard laboratory device used for PCR that was not proprietary to QuantaLife), which performs the heating and cooling cycle necessary to run the PCR reaction. The droplets are then transferred to another device (a droplet reader), which detects the presence or absence of a known DNA sequence. Software analyzes the results to count the number of positive droplets and can provide an absolute quantification of nucleic acids in the starting genetic material.

QuantaLife obtained patents related to digital PCR in droplets. QuantaLife called its product ddPCR (droplet digital PCR).

50. In the summer of 2011, QuantaLife began selling its ddPCR products commercially. These products included both devices like the droplet generator and droplet reader and the consumables (microfluidic chips and reagents) used in the devices. QuantaLife's products proved to be commercially viable, and Bio-Rad purchased the company in the Fall of 2011.

51. In 2013, RainDance launched a ddPCR product called "RainDrop" that competed with the ddPCR products that Bio-Rad sold following its acquisition of QuantaLife. Like QuantaLife, RainDance sold two devices (a droplet generator and a droplet reader) and consumables. At the time, Bio-Rad was already the dominant firm in the ddPCR product market with over a 90% share. RainDance was a nascent competitor with less than a 10% share.

52. Also, RainDance had a patent portfolio including both patents naming its employees as inventors and patents that it had licensed from others. RainDance's patents related to PCR amplification of nucleic acids within droplets. In 2015, RainDance's regulatory filings stated that it had "secured exclusivity through owned patents and in-licensing in critical droplet technologies such as droplet generation, merging fluids into droplets, libraries of droplets and sequence enrichment. Additionally, we have proprietary positions in the core functionality of our RainDrop dPCR platform that is common to a variety of applications. . . . The scope of our patent portfolio provides us with a significant competitive advantage over potential competitors in our target markets."

C. Next Generation DNA Sequencers—"Reading" Many DNA Sequences

53. While PCR-based techniques were developed to accurately quantify the amount of known DNA sequences, different techniques and technology have been developed to allow researchers to "read" many known or previously unknown sequences of nucleotides in parallel.

54. DNA sequencing generally is the process of determining the order of the nucleotides or base pairs in DNA. There are several technological approaches to sequencing DNA. Given the rapidly evolving nature of the DNA sequencing industry, it is common for those developing techniques to sequence DNA to seek patent protection for proprietary sequencing-related technologies. The first techniques for DNA sequencing came about in the 1970s in the work of biochemist Frederick Sanger and in the 1980s, biotech companies developed commercially-sold devices that implemented Sanger's technique. These first-generation sequencers are called "Sanger sequencers."

55. In the 2000s, companies began to develop "next generation" sequencing ("NGS") techniques that use a high-throughput approach that sequenced many segments of DNA at once. Each individual sequence determined was typically short, and so longer DNA strands typically have been broken up into many smaller pieces for sequencing. By sequencing large numbers of DNA strands in parallel, NGS has increased the speed of sequencing while lowering the cost per nucleotide. NGS does not require the researcher to specify in advance a particular nucleic acid sequence to be examined in an experiment. NGS can "read" a previously unknown sequence of nucleotides and requires no initial information from the researcher regarding the sequences that are being "read."

D. The 10X Innovations

56. After working at Bio-Rad for a time after the QuantaLife acquisition, individuals from QuantaLife left Bio-Rad, eventually founding the company that became 10X. 10X does not make ddPCR products. Instead, it has created new products that use novel applications of microfluidic droplets, gel beads, and barcodes to prepare genetic material for use in next-generation sequencers.

57. 10X's initial product line involved "linked long-read" genome sequencing. It can be challenging to sequence an entire genome of an organism because it is extremely lengthy or determine whether multiple sequences are in a single strand of DNA. When using NGS, copies of the genome need to be divided into very short strands. The resulting short sequences must then be computationally put back together, with assistance from specialized computer software. 10X developed proprietary technology using gel beads with releasably attached barcodes in droplets that allowed researchers to group multiple shorter sequences together, simplifying the computational task of reassembling the entire genome or identifying multiple sequences that were together in the same strand of DNA.

58. 10X also developed a range of applications for single-cell NGS analysis using its groundbreaking approach of placing gel beads with releasably attached barcodes in droplets, including, for example, analyses of DNA, RNA, protein, and epigenetics. In particular, 10X developed technology to use microscopic gel beads, each of which has millions of copies of a unique DNA "barcode" that are attached to it. Those gel beads are placed in droplets together with cells (which contain nucleic acids), and the barcodes are released from the gel beads within the droplets. Those barcodes are used to associate nucleic acid sequences with a single cell.

59. 10X's products allow researchers to efficiently investigate biological function on a cell-by-cell basis using NGS, instead of being limited to tissues or collections of cells. This innovation has numerous practical applications. For example, researchers are now learning that tumors are not always composed of exact copies of the same cell but are sometimes made up of cells with different genomes. 10X's products allow researchers to investigate these differences.

RELEVANT MARKETS

60. As stated above, this case concerns three relevant antitrust markets: (1) the ddPCR Product Market, (2) the Droplet Genetic Analysis Technology Market, and (3) the Droplet Single-

Cell Product Market. The two product markets are downstream from the Droplet Genetic Analysis Technology Market.

A. Product Markets

1. The ddPCR Product Market

61. ddPCR products are systems for performing ddPCR analysis. A primary function of ddPCR products is quantification of a specific, known sequence of DNA in a given genetic material.

62. While some older products, in particular real-time PCR and non-droplet-based dPCR products, can also quantify a given DNA or RNA sequence in a unit of genetic material, customers do not view them as reasonable substitutes for ddPCR. ddPCR is the vast majority of the dPCR field. Real-time PCR is generally viewed as inferior to ddPCR in accuracy, sensitivity, and ease of use.

63. Because consumers of ddPCR products do not see other products as reasonable substitutes, they would need to continue to purchase ddPCR products even if their price increased substantially. Thus, a monopolist of ddPCR products could profitably impose a small but significant and non-transitory increase in price on consumers above the price in a competitive market. In fact, on information and belief, Bio-Rad did increase prices after acquiring RainDance.

64. The market for ddPCR products is at least nationwide.

65. Bio-Rad is a competitor in the market for ddPCR products and controls in excess of 90% of that market. On information and belief, Stilla is the only other meaningful competitor in the ddPCR Product Market and it has only single-digit market share. Bio-Rad is seeking to exclude Stilla by suing it for patent infringement.

66. 10X is a customer in the market for ddPCR products and has purchased ddPCR products from Bio-Rad including during the time following Bio-Rad's acquisition of RainDance.

2. The Market for Droplet Single-Cell Products

67. Within the genetics research-tools industry, NGS Sample Prep products are used to prepare samples for particular next-generation sequencing applications.

68. One area of research that requires tailored NGS Sample Prep tools is single-cell analysis. In conventional genetic research, DNA and RNA strands from multiple cells are analyzed together. But recognizing that different cells in a population may have different sets of genes being expressed (that is, actively being used to make protein), scientists have begun to develop single-cell techniques (*i.e.,* techniques that allow observation of differences among cells). This demand for single-cell analysis has created a market for droplet-based single-cell NGS Sample Prep products, *i.e.*, the Droplet Single-Cell Product Market. By dividing the population of cells among droplets that can be automatically processed and analyzed, researchers can perform tasks that they cannot perform cost-effectively with other products. Droplet-based single-cell NGS Sample Prep allows scientists to divide individual cells into droplets for cell-by-cell processing before the genetic material is further processed for use in machines that sequence DNA. For example, single cell sequencing in droplets allows researchers to efficiently process large numbers of cells for NGS. Lower throughput processing methods are not an adequate substitute for high-throughput droplet-based methods.

69. For these reasons and others, many researchers that use droplet-based single-cell NGS Sample Prep products would not see other products as reasonable substitutes and would continue to purchase droplet-based single-cell NGS Sample Prep products despite a substantial increase in price. For example, Bio-Rad's Executive Vice President and President, Life Science Group, Annette Tumolo, has claimed that it is not practical to do single cell NGS analysis without using droplets. A hypothetical monopolist of droplet-based single-cell NGS Sample Prep products

could therefore profitably impose a small but significant and non-transitory increase in price on consumers above the price in a competitive market.

70. The market for droplet-based single-cell NGS Sample Prep products is at least nationwide.

71. 10X is a lead innovator in this market. Bio-Rad competes in this market by marketing its ddSEQ single-cell sequencing products. Bio-Rad markets its products performing two of the types of analysis performed by 10X's products: single-cell RNA sequencing and single-cell assay for transposase-accessible chromatin ("ATAC"). 10X's products also perform sample prep for additional NGS-based analysis not supported by the Bio-Rad products, thereby providing 10X's customers with more options, and Bio-Rad does not compete for those additional types of NGS-based analysis. 10X and Bio-Rad together provide the majority of all products in the market for droplet-based single-cell NGS Sample Prep products.

B. Droplet Genetic Analysis Technology Market

72. To make and market droplet-based genetic analysis products, an entity must be able to practice the technologies underlying such products. For example, Bio-Rad has claimed that the intellectual property acquired from RainDance encompasses a wide range of biological reactions in droplets with potential applications in life science research and clinical research, including NGS applications. Any new entrant into the product market for droplet-based genetic analysis would need to either license proprietary technologies invented by an existing manufacturer/rights-holder or invent its own, non-infringing technologies. Thus, the Droplet Genetic Analysis Technology Market includes patents asserted to cover technology related to droplet-based genetic analysis.

73. A hypothetical monopolist in the Droplet Genetic Analysis Technology Market could profitably impose a small but significant and non-transitory increase in price of that technology above the price in a competitive market.

74. Bio-Rad alleges that it has broad rights concerning droplet-based genetic analysis technology. These allegations, if true, would mean that Bio-Rad would be a monopolist in this market. Further demonstrating that Bio-Rad believes it is a monopolist, Bio-Rad believed that its aggregation of the Bio-Rad and RainDance patent portfolios would allow it to charge higher royalties because consumers in the technology market (*i.e.*, would-be licensees) would have no ability to choose to license from the RainDance IP holder rather than from Bio-Rad.

75. The Droplet Genetic Analysis Technology Market is nationwide.

76. 10X is both a competitor and a customer in this market. 10X is a competitor because it is an innovator in the Droplet Single-Cell Product Market and 10X owns patents in this field that are developed by its own employees. But 10X has also licensed patents in this market and could potentially have settled with RainDance and licensed the RainDance patents but for Bio-Rad's illegal acquisition; and 10X is also a customer in this market.

BIO-RAD'S UNLAWFUL ACQUISITION OF RAINDANCE

77. In January 2017, Bio-Rad acquired RainDance. The main purpose of the acquisition was to acquire the RainDance patents and eliminate competition. Bio-Rad's acquisition of RainDance was illegal and anticompetitive and substantially lessened competition in multiple relevant antitrust markets. In addition, the acquisition was part of Bio-Rad's attempt to monopolize and/or monopolization of those markets and was part of a scheme whose purpose was to do the same. After acquiring RainDance, Bio-Rad subsequently terminated RainDance's products, curtailed its research and development, and used the illegally acquired patents in litigation in the furtherance of that same scheme and to monopolize or attempt to monopolize multiple relevant antitrust markets.

A. ddPCR Product Market

78. Following RainDance's release of its ddPCR product offering, RainDance was a small nascent competitor in the ddPCR Product Market. At that time, customers interested in using ddPCR could purchase ddPCR products from either RainDance or Bio-Rad.

79. Bio-Rad purchased RainDance in January 2017, eliminating competition in the ddPCR Product Market. After the acquisition, there was no other competitive manufacturer producing ddPCR products.

80. Prior to the RainDance acquisition, Bio-Rad's Annette Tumolo publicly stated that the acquisition of RainDance's ddPCR products would strengthen Bio-Rad's position in digital PCR. Bio-Rad also stated publicly that it welcomed the opportunity to expand its product offering with RainDance's products and technologies, and Bio-Rad stated that there would be combined droplet-based solutions.

81. However, Bio-Rad's actual purpose with the acquisition was to eliminate RainDance as a competitive threat. Since the acquisition, Bio-Rad has eliminated RainDance's research-and-development efforts, and all but eliminated RainDance's product line (except for the temporary provision of products and service for existing customers). Bio-Rad's trial counsel has represented that Bio-Rad's Annette Tumolo articulated Bio-Rad's plan for RainDance as: buy the company, disable the products, stop selling them, maybe provide support to a few people, and get out of the business.

B. Droplet Genetic Analysis Technology Market

82. RainDance and Bio-Rad were also competitors in the Droplet Genetic Analysis Technology Market. Both Bio-Rad and RainDance have asserted that their intellectual property covers a broad range of droplet-based genetic analysis including 10X's products.

83. Bio-Rad believed acquiring RainDance would reduce licensing competition and reduce uncertainty about the licensing fees it could charge by eliminating the risk of competing with another holder of the RainDance patent portfolio.

84. As a result of Bio-Rad's aggregation of these two separate patent portfolios, competition for patent licensing has been substantially lessened. In effect, Bio-Rad's goal was that anyone seeking to commercially develop products that perform genetic analysis using droplets would have to seek a license from Bio-Rad and would have no competitive alternative.

85. Bio-Rad's acquisition of RainDance was part of a pattern of Bio-Rad's behavior of acquiring other competitors to aggregate their patents and eliminate competition in technology markets. For example, in 2014, Bio-Rad acquired GnuBio, a company developing a droplet-based sequencing workflow, and aggregated its patents with those of Bio-Rad.

86. The anticompetitive effects of Bio-Rad's RainDance acquisition in the Droplet Genetic Analysis Technology Market are exemplified by the fact that, before the acquisition, it was more likely that 10X could have obtained a monetary settlement with a license to the RainDance portfolio on competitive terms, whereas post-acquisition, Bio-Rad has refused to negotiate a license on competitive terms and has obtained a damages award in the 152 Case that (if upheld) represents a substantially increased royalty over the expected royalty had the patents been licensed by RainDance or another entity lacking Bio-Rad's specific incentives. Both the damages award and the injunction, which are currently subject to appeal, are the direct result of Bio-Rad's unlawful acquisition of RainDance. The anticompetitive effects are further exemplified by Bio-Rad's (incorrect) assertions that the aggregated patent portfolio not only blocks 10X from using the technology in its historical product offerings but also blocks 10X from using the substitute product

designs it created to avoid further allegations of infringement by Bio-Rad on the patents Bio-Rad asserted in its first wave of patent lawsuits.

87. As a result of Bio-Rad's illegal acquisition of RainDance, a competitor seeking to enter or remain in any of the product markets downstream from the technology market where Bio-Rad sought to assert monopoly power would face costly barriers to entry, including: (1) the thicket of patents ostensibly covering these areas created by the RainDance acquisition, which requires innovators to obtain costly licenses or face the task of inventing newly designed products that are not alleged to be infringing; and (2) costly patent litigation premised on these patent thickets and the elimination of RainDance as alternative for licensing technology.

88. Bio-Rad's acquisition of RainDance also substantially lessened competition and tended to create monopoly with respect to patent licenses that, if Bio-Rad's assertions have merit, cover patents that constituted technological inputs for those seeking to develop and manufacture NGS Sample Prep and other products. This reduction in competition increased cost and risk those seeking to use droplet-based technology, and this increased cost and risk could lead some companies to abandon the use of such technology altogether. Bio-Rad has subsequently used the combined QuantaLife and RainDance patent portfolios to attempt to exclude competitors for both ddPCR and NGS-related products.

89. Another example concerns Stilla, a company that more recently attempted to enter the ddPCR Product Market. Bio-Rad has sued Stilla for patent infringement in this Court, seeking to use its illegally acquired patent assets to protect its monopoly in the ddPCR Product Market.

90. Another example is Bio-Rad's litigation campaign against 10X in an attempt to exclude 10X from the Droplet Single-Cell Product Market and monopolize that market like it has ddPCR.

91. Even though ddPCR and 10X's technology are very different, after 10X was founded, Bio-Rad asserted that it held rights over the range of droplet-based genetic analysis platforms, including 10X's. Bio-Rad embarked on a years-long campaign to keep 10X and its products under a permanent cloud of litigation. Bio-Rad implemented this campaign by filing and/or maintaining the numerous litigations described above based on its aggregated patent portfolio. Among the assets Bio-Rad acquired from RainDance was the 152 Case, which RainDance had filed against 10X. As explained above, RainDance, or a buyer other than Bio-Rad, would not have been able to obtain the same relief Bio-Rad received in that case (currently on appeal) and there is a higher probability that 10X would have been able to obtain a monetary settlement of the ongoing litigation and a license to the RainDance patents but for the anticompetitive acquisition. Bio-Rad, however, used the assets of the unlawful acquisition to exclude certain of 10X's products and to attempt to monopolize the Droplet Single-Cell Product Market.

92. Bio-Rad did not stop there. 10X expended significant time and money developing newly designed products with similar functionality that have not been determined to be infringing. After obtaining its injunction against 10X's older products (in part by telling the Court that 10X's new products negated concerns about issuing such an injunction), Bio-Rad took aim at 10X's newly designed products both in the present action (and in the 1699 Case) and the 1679 Case. These new actions also represent Bio-Rad's use of the illegally acquired RainDance assets to attempt to monopolize the Droplet Single-Cell Product Market as well as the upstream Droplet Genetic Analysis Technology Market. Bio-Rad's use of the illegally acquired RainDance patents is at once part of the harm that 10X has suffered as a consequence of Bio-Rad's illegal acquisition and also a part of Bio-Rad's attempt to monopolize the multiple markets alleged herein.

93. Additionally, Bio-Rad's violation of the antitrust laws by its unlawful acquisition of RainDance is part of an illegal scheme the purpose of which is to lessen competition and monopolize the multiple markets alleged herein. Bio-Rad's lawsuits, including those utilizing the illegally acquired assets are also a part of the same scheme. Bio-Rad's unlawful acquisition of RainDance has also caused harm to 10X through the litigation based on the acquired patent rights.

94. Additionally, on information and belief, Bio-Rad brought these lawsuits based on the illegally acquired RainDance patents for the purpose of keeping its competitor 10X under a constant cloud of litigation. The patents Bio-Rad has asserted in these actions do not reflect its own innovations but are patents or patent applications to which it gained access through the QuantaLife and RainDance portfolios. This campaign of litigation is designed to use Bio-Rad's unlawful aggregation of the RainDance patent portfolio with its then-existing portfolio to intimidate, weaken, exclude, and/or acquire 10X and to prevent 10X from competing in the Droplet Single-Cell Product Market.

BIO-RAD'S ATTEMPT TO MONOPOLIZE THE DROPLET SINGLE-CELL PRODUCT MARKET

95. In 2017, Bio-Rad launched its ddSEQ, droplet based single-cell NGS sample prep product, and more recently launched ATAC-Seq application and consumables that are also used on the ddSEQ instrument.

96. Bio-Rad has a specific intent to monopolize the Droplet Single-Cell Product Market and exclude 10X from this market. Today, 10X is the largest manufacturer in the Droplet Single-Cell Product Market, while Bio-Rad has a smaller market share. But Bio-Rad's litigation campaign is designed to give Bio-Rad monopoly power over the Droplet Single-Cell Product Market by using its illegally aggregated market power to exclude 10X from this market. Bio-Rad seeks to do this either by driving 10X out of the market or by acquiring 10X and assuming 10X's market share as

its own. Indeed, Annette Tumolo recently stated to 10X employees that 10X and Bio-Rad were one or two rulings away from being part of the same company.

97. Indeed, Bio-Rad has claimed that competition with 10X is depressing prices in the marketplace. Bio-Rad's claim confirms that Bio-Rad will raise its prices if it succeeds at excluding 10X.

98. Bio-Rad has since filed three additional lawsuits (with two still pending), including this one, the 1699 Case (now dismissed), and the 1679 Case, alleging that 10X's redesigned products, Next GEM, should also be enjoined.

99. The timing of Bio-Rad's 1699 Case demonstrates Bio-Rad's specific intent to exclude 10X. As already noted, Bio-Rad filed that lawsuit and put out a press release announcing the lawsuit, and announcing that it would seek to enjoin 10X's Next GEM product line, on the very day that 10X's initial public offering was priced and the offering documents declared effective by the U.S. Securities & Exchange Commission. Indeed, Bio-Rad filed the case hurriedly in the District of Delaware, the wrong forum, with the intent to derail 10X's IPO and for the purpose of excluding 10X and impairing competition by interfering with 10X's planned IPO.

100. Bio-Rad's specific intent to monopolize is also demonstrated by its inconsistent representations to different courts. In the present case and the 1679 Case in Delaware, Bio-Rad seeks an injunction against 10X's newly designed Next GEM products, and Bio-Rad has publicized the fact that it is seeking to enjoin Next GEM. But Bio-Rad previously obtained an injunction order and a limited exclusion order against 10X's older products in the 152 and 1068 Cases, arguing that the commercial availability of 10X's new Next GEM products meant that excluding or enjoining 10X's products would not create public interest issues. For example, the Commission in the 1068 Investigation determined that 10X's technology platform enabled research including that related to

cancer (the second leading cause of death in the United States) and heart disease (the leading cause of death in the United States). Relying on the commercial availability of the Next GEM chips, the Commission concluded that the remedial orders it issued would not harm the public interest.

101. In addition to reflecting intent to monopolize, Bio-Rad's conduct, taken as a whole, forms an anticompetitive scheme. Each part of this scheme independently caused the anticompetitive harms described herein. Bio-Rad's suits using its wrongfully acquired patents are part of the way in which Bio-Rad accomplishes its anticompetitive scheme. Bio-Rad's unlawful acquisition of RainDance has also caused harm to 10X through the litigation based on the acquired patent rights, including the present litigation.

102. There is a dangerous probability that Bio-Rad could, through its continued litigation including the use of its illegally acquired assets, substantially weaken 10X as a competitor and exclude 10X from the market and thus obtain monopoly power in the Droplet Single-Cell Product Market.

HARM TO COMPETITION

103. Through its unlawful acquisition of RainDance and other exclusionary conduct, Bio-Rad has harmed competition.

104. First, Bio-Rad's acquisition of RainDance eliminated competition in the ddPCR Product Market. Bio-Rad has since used its monopoly power in the ddPCR Product Market to raise prices. Specifically, prices for ddPCR consumables have increased, which has directly harmed purchasers in the ddPCR Product Market, including 10X. Further, by eliminating RainDance's ddPCR product line, Bio-Rad has reduced the number of distinct options available to customers in the ddPCR Product Market. Bio-Rad has also used its control of technology upstream from the ddPCR Product Market in an attempt to exclude Stilla from the ddPCR Product Market.

105. Bio-Rad has also harmed competition using its monopoly power in the market for technology related to genetic analysis on a droplet platform that sits upstream from the ddPCR Product Market and, according to Bio-Rad's allegations, upstream from the Droplet Single-Cell Product Market. Were it not for the RainDance acquisition, Bio-Rad and RainDance would have competed to license this technology. Instead, Bio-Rad has insisted on increased license fees, refused to license its technology, or both. The imposition of supracompetitive licensing costs or the refusal to license patents in Bio-Rad's illegally aggregated patent portfolio further excludes competition and increases barriers to entry.

106. Bio-Rad has used its acquisition of RainDance and its illegally aggregated patents to seek to exclude 10X from the Droplet Single-Cell Product Market.

107. Consumers in these product markets have been and will be harmed by Bio-Rad's efforts to exclude its competitors, facing higher prices and lower-quality products. 10X is the lead innovator in the NGS prep space. Exclusion of 10X from the market and Bio-Rad's attempt to monopolize or actual monopolization of those product markets has resulted in increased prices for products that the scientific community has come to depend upon, increased cost and restricted options to enter or remain in the market for potential competitors, slower pace of innovation, reduction of quality of product offerings, and a restriction of choices.

ANTITRUST INJURY TO 10X

108. Bio-Rad's anticompetitive conduct has directly harmed 10X as a result of the reduction in competition in each of the relevant markets.

109. First, 10X is a customer in the ddPCR Product Market. 10X has thus suffered harm from the increase in prices since the RainDance acquisition.

110. Second, 10X has suffered substantial damages as a result of Bio-Rad's anticompetitive acquisition of the RainDance patent portfolio and the lessening of competition in

the Droplet Genetic Analysis Technology Market. Bio-Rad's aggregation of RainDance's assets with its own enabled Bio-Rad to increase the price to 10X of licensing the RainDance patents, deny 10X a license altogether that it was more likely to obtain through litigation settlement with RainDance, and reduce 10X's opportunities to identify new designs or substitute technologies that it could license.

111. Third, 10X has suffered substantial damages as a result of Bio-Rad's attempted monopolization of the Droplet Single-Cell Product Market. Because of Bio-Rad's refusal to settle the RainDance litigation on the competitive terms that 10X was more likely to have obtained from RainDance without the merger, 10X had to develop costly new designs for droplet-based single-cell NGS Sample Prep products. 10X also incurred significant costs to defend against Bio-Rad's litigation including based on the illegally acquired RainDance patent portfolios. These include legal fees as well as business opportunities and profits that 10X has lost because its executives and employees are occupied by litigation and because of the effects of the litigation and statements about it in the marketplace. If Bio-Rad had not unlawfully acquired RainDance, 10X could have pursued monetary settlement with RainDance, and licensing RainDance's patent portfolio would have meant that Bio-Rad would not have been able to charge many multiples of the competitive licensing prices. Nor would RainDance have been able to obtain an injunction because that injunction was based on alleged competition between 10X's products and Bio-Rad's products and not on any alleged competition with RainDance.

112. At present, Bio-Rad has obtained an injunction order in the 152 Case (asserting RainDance patents) that 10X is appealing and a Limited Exclusion Order in the 1068 Investigation (asserting patents that issued from alleged rights that Bio-Rad acquired before the RainDance acquisition) that is still subject to presidential review as well as appeal. Both of those pending forms

of injunctive relief are aimed at keeping 10X's historical products off the market and both of those decisions were premised in part on the existence of 10X's newly designed substitute products, Next GEM, being available in the market. Bio-Rad argued this would address the public interest concerns associated with enjoining 10X's products. Bio-Rad's current litigations in the present case and in the District of Delaware use RainDance-acquired patents to seek to exclude those same Next GEM products. Exclusion or potential exclusion of those products in either the present lawsuit or Bio-Rad's lawsuit in Delaware reflects antitrust injury to 10X because it flows directly from the anticompetitive nature of the RainDance acquisition and the aggregation of the RainDance portfolios in Bio-Rad's hands.

113. Exclusion or potential exclusion of 10X's Next GEM products in either the present lawsuit or Bio-Rad's lawsuit in Delaware reflects antitrust injury to 10X because it flows directly from the anticompetitive nature of the RainDance acquisition and the aggregation of the RainDance portfolios in Bio-Rad's hands. Likewise, an injunction against 10X's historical products in the 152 Case reflects antitrust injury to 10X because it likewise flows directly from the anticompetitive nature of the RainDance acquisition and the aggregation of the RainDance portfolios in Bio-Rad's hands. Further, 10X has suffered antitrust injury due to Bio-Rad's acquisition of RainDance because of Bio-Rad's incentive, as a competitor in the Droplet Single-Cell Product Market, to inflate licensing rates or deny licenses altogether to foreclose competitors in the Droplet Single-Cell Product Market. Bio-Rad was placed in a position to act on that incentive when it acquired RainDance and has so acted against 10X.

COUNT I
(Unlawful Acquisition in Violation of Section 7 of the Clayton Act, 15 U.S.C. § 18) (Droplet Single-Cell Product Market)

114. 10X hereby re-alleges and incorporates by reference the allegations set forth in paragraphs 1 through 113 above.

115. Bio-Rad's acquisition of RainDance had the effects, and continues to have the effects, of substantially lessening competition and tending to create a monopoly in the Droplet Single-Cell Product Market.

116. Unless Bio-Rad is required to divest the RainDance patent portfolio to a third party willing and able to license those patents at competitive rates and/or rates not inflated by the incentive to foreclose competitors in the Droplet Single-Cell Product Market, its acquisition of RainDance will continue to have at least the following anticompetitive effects in the Droplet Single-Cell Product Market:

(a) excluding or threatening to exclude competitors with superior products for droplet-based single-cell NGS Sample Prep;

(b) reducing innovation in droplet-based single-cell NGS Sample Prep products.

117. In the absence of such injunctive relief, 10X will suffer irreparable harm in the form of being forced to continue to divert time and resources from its business to oppose Bio-Rad's lawsuits that are brought based on illegally acquired patents, being denied patent licensing opportunities that are either necessary or alleged to be necessary so that 10X can market and sell its products in the foregoing product market, and to the extent that Bio-Rad's suits are not ultimately defeated on their merit and that Bio-Rad is allowed to have injunctive relief in such lawsuits (all of which 10X opposes), exclusion from the Droplet Single-Cell Product Market, and reduction of competition by eliminating a superior and more efficient competitor with no corresponding economic justification.

COUNT II
(Unlawful Acquisition in Violation of Section 7 of the Clayton Act, 15 U.S.C. § 18) (Droplet Genetic Analysis Technology Market)

118. 10X hereby re-alleges and incorporates by reference the allegations set forth in paragraphs 1 through 117 above.

119. Bio-Rad's acquisition of RainDance had the effects, and continues to have the effects, of substantially lessening competition and tending to create a monopoly in the Droplet Genetic Analysis Technology Market for genetic analysis on a droplet platform.

120. Unless Bio-Rad is required to divest the RainDance patent portfolio to a third party willing and able to license those patents at competitive rates and/or rates not inflated by the incentive to foreclose competitors in the Droplet Single-Cell Product Market, its acquisition of RainDance will continue to have at least the following anticompetitive effects in the Droplet Genetic Analysis Technology Market:

(a) excluding or threatening to exclude competitors with superior technology for droplet-based single-cell NGS Sample Prep or droplet-based genetic analysis;

(b) reducing innovation in droplet-based single-cell NGS Sample Prep products.

121. In the absence of such injunctive relief, 10X will suffer irreparable harm in the form of being forced to continue to divert time and resources from its business to oppose Bio-Rad's lawsuits that are brought based on illegally acquired patents, being denied patent licensing opportunities that are either necessary or alleged to be necessary so that 10X can market and sell its products, and to the extent that Bio-Rad's suits are not ultimately defeated on their merit and that Bio-Rad is allowed to have injunctive relief in such lawsuits (all of which 10X opposes), exclusion from the Droplet Single-Cell Product Market as well.

COUNT III
(Attempted Monopolization of Droplet Single-Cell Product Market in Violation of Section 2 of the Sherman Act, 15 U.S.C. § 2)

122. 10X hereby re-alleges and incorporates by reference the allegations set forth in paragraphs 1 through 121 above.

123. Bio-Rad has engaged in predatory or anticompetitive conduct, including:

(a) Unlawfully acquiring RainDance and the RainDance patent portfolio.

(b) Refusing to license its patent portfolios at reasonable rates, or at all.

(c) Using that portfolio to file patent litigation against actual or potential competitors seeking to use technology for genetic analysis on a droplet platform.

124. Bio-Rad had a specific intent to monopolize the markets for Droplet Single-Cell Product Market.

125. Through its conduct, Bio-Rad has created a dangerous probability of achieving monopoly power in each of the foregoing product market.

126. As a direct and proximate cause of Bio-Rad's conduct, 10X has suffered irreparable harm including: suffering the cost, distraction and lost opportunities arising from having to defend against Bio-Rad's patent-infringement lawsuits; and being less able to continue to develop and sell droplet-based single-cell NGS Sample Prep products. In the event that Bio-Rad is ultimately able to win on the merits of its lawsuits, which 10X disputes, 10X will suffer the additional harm of being forced to pay supracompetitive royalties on illegally acquired patents and/or being excluded from the Droplet Single-Cell Product Market.

127. 10X and others will continue to suffer such irreparable harm absent appropriate injunctive relief.

COUNT IV
(Monopolization or Attempted Monopolization or Monopoly Maintenance of the Droplet Genetic Analysis Technology Market in Violation of Section 2 of the Sherman Act, 15 U.S.C. § 2)

128. 10X hereby re-alleges and incorporates by reference the allegations set forth in paragraphs 1 through 127 above.

129. Bio-Rad seeking to defend the present injunction order and/or damages award in the 152 Case, and/or obtain injunctive or damages relief against Next GEM in this or another lawsuit alleging infringement by Next GEM, notwithstanding that 10X disputes the merits of any and all

such injunctive relief, is an attempt by Bio-Rad to possess monopoly power in the Droplet Genetic Analysis Technology Market.

130. Bio-Rad willfully attempted to acquire that monopoly power and/or obtained that power and/or maintained that power through its acquisition of RainDance, not as a consequence of its superior products, business acumen, or historic accident. To the extent that Bio-Rad defends the injunction or damages award in the 152 Case successfully and/or successfully obtains injunctive or damages relief against Next GEM, Bio-Rad will have established such monopoly.

131. To the extent that Bio-Rad does not already have such power, there is a dangerous probability that Bio-Rad will succeed at obtaining such monopoly power because if Bio-Rad's lawsuits are successful at forcing 10X to in effect pay licensing royalties (in the form of damages) or be enjoined from selling both its historical products and its Next GEM products then Bio-Rad will in effect have obtained monopolistic market share for the Droplet Single-Cell Product Market downstream from the Droplet Genetic Analysis Technology Market where Bio-Rad seeks to obtain or maintains monopoly power.

132. As a direct and proximate cause of Bio-Rad's conduct, 10X has suffered and/or will suffer irreparable harm including: suffering the cost, distraction and lost opportunities arising from having to defend against Bio-Rad's patent-infringement lawsuits; being less able to continue to develop and sell droplet-based single-cell NGS Sample Prep products; and being excluded from the Droplet Single-Cell Product Market.

133. 10X and others will continue to suffer such irreparable harm absent appropriate injunctive relief.

COUNT V
(Unlawful Acquisition in Violation of Section 7 of the Clayton Act, 15 U.S.C. § 18)
(ddPCR Products)

134. 10X hereby re-alleges and incorporates by reference the allegations set forth in paragraphs 1 through 133 above.

135. Bio-Rad's acquisition of RainDance had the effects, and continues to have the effects, of substantially lessening competition and tending to create a monopoly in the ddPCR Product Market.

136. Unless Bio-Rad is required to divest RainDance and its assets, Bio-Rad's acquisition of RainDance will continue to have at least the following anticompetitive effects in the ddPCR Product Market:

(a) raising prices that consumers must pay for ddPCR products;

(b) reducing innovation in ddPCR products.

137. In the absence of such injunctive relief, 10X will suffer irreparable harm in the form of paying supracompetitive prices for ddPCR products.

COUNT VI
(Monopolization or Monopoly Maintenance of ddPCR Product Market in Violation of Section 2 of the Sherman Act, 15 U.S.C. § 2)

138. 10X hereby re-alleges and incorporates by reference the allegations set forth in paragraphs 1 through 137 above.

139. Bio-Rad possesses monopoly power in the ddPCR Product Market.

140. Bio-Rad willfully acquired and/or maintained that monopoly power through its acquisition of RainDance, not as a consequence of its superior products, business acumen, or historic accident, and continues to maintain that monopoly power through its anticompetitive use of the unlawfully acquired RainDance patent portfolio.

141. As a direct and proximate cause of Bio-Rad's conduct, 10X has suffered harm including: paying supracompetitive prices for ddPCR devices and consumables; suffering the cost, distraction and lost opportunities arising from having to defend against Bio-Rad's patent-infringement lawsuits; and being less able to continue to develop and sell droplet-based single-cell NGS Sample Prep products.

142. 10X and others will continue to suffer such irreparable harm absent appropriate injunctive relief.

COUNT VII
(Unfair Competition in Violation of California Business & Professions Code § 17200 et seq.)

143. 10X hereby re-alleges and incorporates by reference the allegations set forth in paragraphs 1 through 142 above.

144. Bio-Rad has engaged in Unfair Competition under § 17200 et seq. of the California Business and Professions Code (UCL) by engaging in unlawful and unfair conduct. Bio-Rad's unlawful and unfair conduct has harmed competition in California and elsewhere and threatens significant harm to competition in the future. Bio-Rad's conduct is the direct and proximate cause of injury to California consumers and to 10X.

145. Bio-Rad has engaged in unlawful conduct in violation of the UCL, including based on the conduct alleged above that also violates Section 2 of the Sherman Act and Section 7 of the Clayton Act. Bio-Rad's unfair conduct threatens an incipient and continuing violation of the antitrust laws and also violates the policy and spirit underlying those laws because the effects of Bio-Rad's conduct are comparable to or the same as violations of those laws, or because Bio-Rad's conduct otherwise significantly harms competition. Bio-Rad's unfair competition includes multiple acts any of which alone, and any combination of which, is sufficient to show a violation of the UCL including at least the following:

(a) Unlawfully acquiring RainDance and the RainDance patent portfolio so as to deny would-be licensees including 10X the opportunity to license those patents at all or at non-supracompetitive rates and for the purpose of denying necessary inputs to its competitors including 10X.

(b) Using an illegally and unfairly acquired portfolio to file patent litigation against actual or potential competitors including 10X for the purpose of harming competition and excluding competitors including 10X.

(c) Attempting to monopolize and/or monopolizing the antitrust markets as alleged herein.

146. These acts constitute violations of the UCL (and antitrust laws) as alleged herein *supra* and at the very least significantly threaten or harm competition in the Droplet Single-Cell Product Market and the Droplet Genetic Analysis Technology Market.

147. These acts have caused harm to competition in at least the ways alleged in the foregoing paragraphs.

148. 10X has suffered harm as a direct, proximate, and foreseeable result of Bio-Rad's actions alleged herein. Such harm includes but is not limited to needing to divert resources from its business to oppose Bio-Rad's lawsuits that are brought based on illegally acquired patents, being denied patent licensing opportunities that are either necessary or alleged to be necessary so that 10X can market and sell its products, and being excluded or being threatened with exclusion from the relevant markets. Harm suffered by 10X is further detailed in the foregoing paragraphs.

149. California consumers have been harmed and are threatened with continued harm as a direct, proximate, and foreseeable result of Bio-Rad's unlawful and unfair actions. Bio-Rad's unlawful and unfair conduct has already harmed researchers in California who rely upon 10X's

NGS sample prep products. These researchers are threatened with a reduced rate and/or increased cost of scientific discovery in areas where they use 10X products. This harm to California consumers is not limited to the scientific community, but likely extends to the medical community and the community at large who depend upon the pace of scientific discovery for advances toward treating and curing critical illnesses.

150. 10X seeks an Order of this Court permanently enjoining Bio-Rad's unlawful and unfair business practices as alleged herein and other relief the Court deems appropriate.

151. 10X and others will continue to suffer such irreparable harm absent appropriate injunctive relief.

II. DECLARATORY JUDGMENT COUNTERCLAIMS

Counterclaim Plaintiff 10X hereby alleges declaratory judgment counterclaims against Bio-Rad and Harvard.

NATURE OF ACTION

152. These are counterclaims for declarations of non-infringement, invalidity, and/or unenforceability of one or more claims of U.S. Patent Nos. 8,871,444 (the "444 Patent"), and 9,919,277 (the "277 Patent").

PARTIES

153. Counterclaim Plaintiff 10X is a Delaware corporation with its principal place of business at 6230 Stoneridge Mall Road, Pleasanton, CA 94588.

154. Counterclaim Defendant Bio-Rad is a Delaware corporation with its principal place of business at 1000 Alfred Nobel Drive, Hercules, CA 94547.

155. Counterclaim Defendant Harvard is a Massachusetts institution with a principal place of business at 1563 Massachusetts Ave., Cambridge, Massachusetts 02138.

JURISDICTION AND VENUE

156. This is an action for declaratory judgment of non-infringement, invalidity, and unenforceability of the 444 and 277 Patents arising under the patent laws of the United States, 35 U.S.C. § 1, et seq., and the Declaratory Judgment Act, 28 U.S.C. §§ 2201-2202. An actual case and controversy exists under the Declaratory Judgment Act because Counterclaim Defendants Bio-Rad and Harvard have sued 10X asserting that each of the 444 and 277 Patents is valid, enforceable, and infringed by 10X, and Counterclaim Plaintiff 10X denies Counterclaim Defendants' allegations. This Court has subject matter jurisdiction over these Counterclaims pursuant to 28 U.S.C. § 1331 and 1338(a), in combination with 28 U.S.C. §§ 2201-2202.

157. Personal jurisdiction and venue in this District over Counterclaim Defendants are proper for the purposes of Counts I and II of the Complaint—the only two counts that remain in the case.

BACKGROUND

158. On December 18, 2019, Counterclaim Defendants filed a Complaint against 10X, asserting infringement of two patents, U.S. Patent Nos. 8,871,444 ("the 444 Patent") and 9,919,277 ("the 277 Patent"). Counterclaim Defendants allege in the Complaint that United Kingdom Research and Innovation ("UKRI") and Harvard are the owners of the 444 Patent and the 277 Patent and that Bio-Rad is an exclusive licensee of these patents.

159. In their Complaint, Counterclaim Defendants have expressly accused 10X of infringing the 444 and 277 Patents in Counts I and II.

160. As a result of Counterclaim Defendants' actions and statements, including the filing of the Complaint, an actual and justiciable controversy exists between 10X and Counterclaim Defendants with regard to the validity, infringement, and enforceability of the 444 and 277 Patents.

161. A judicial declaration and determination is necessary and appropriate at this time given Counterclaim Defendants' allegations and in order that 10X may ascertain its rights and duties with respect to the 444 and 277 Patents.

COUNT VIII
(Declaratory Judgment of Non-Infringement of U.S. Patent No. 8,871,444)

162. 10X restates and incorporates by reference the denials, admissions, allegations, and Affirmative Defenses contained in its Answer and Second Amended Counterclaims above as if fully set forth herein. 10X further restates and incorporates by reference its allegations in paragraphs 152 through 161 of its Declaratory Judgment Counterclaims.

163. In their Complaint, Counterclaim Defendants have expressly accused 10X of infringing the 444 Patent.

164. 10X has not been and is not now infringing, directly or indirectly, literally or under the doctrine of equivalents, or willfully, any valid and enforceable claim of the 444 Patent.

165. 10X does not infringe any valid and enforceable claim of the 444 Patent at least because neither 10X nor anyone else has used or uses 10X's Next GEM or GEM products to practice each and every step of the method of the only independent claim of the 444 Patent, Claim 1. For example, neither 10X nor anyone else used or uses 10X's Next GEM or GEM products such that (1) the "microcapsules" are "aqueous" and that "a portion of the plurality of microcapsules contact each other but do not fuse with each other," and (2) "the product of the enzymatic reaction" is "detect[ed]".

166. Additionally, each of the claims of the 444 Patent are invalid and unenforceable as set forth below in Counts IX and X of 10X's Declaratory Judgment Counterclaims. An invalid claim cannot be infringed.

167. In light of the Complaint against 10X, there exists an actual controversy between Counterclaim Defendants and 10X regarding the 444 Patent. Accordingly, a valid and justiciable controversy has arisen and exists between Counterclaim Defendants, Harvard and Bio-Rad, and 10X with respect to the alleged infringement of the 444 Patent. 10X desires a judicial determination and declaration of the respective rights and duties of the parties herein. Such a determination and declaration is necessary and appropriate at this time so that the parties may ascertain their respective rights and duties.

168. 10X is entitled to a declaratory judgment that: (a) it has not infringed, and is not infringing, literally or under the doctrine of equivalents, directly or indirectly, any valid and enforceable claim of the 444 Patent, and (b) it is not liable for any alleged infringement of the 444 Patent.

COUNT IX
(Declaratory Judgment of Invalidity of U.S. Patent No. 8,871,444)

169. 10X restates and incorporates by reference the denials, admissions, allegations, and Affirmative Defenses contained in its Answer and Second Amended Counterclaims above as if fully set forth herein. 10X further restates and incorporates by reference its allegations in paragraphs 152 through 168 of its Declaratory Judgment Counterclaims.

170. 10X contends that the claims of the 444 Patent are invalid for failure to comply with the conditions for patentability, including, but not limited to, 35 U.S.C. §§ 101, 102, 103, and/or 112.

171. For example, the asserted claims 1, 2, 4, 8, and 9 of the 444 Patent ("asserted claims of the 444 Patent") are invalid under Section 102 and/or 103 in view of at least U.S. Patent No. 7,129,091 ("Ismagilov 091"), Exhibit A. Ismagilov 091 was filed on May 9, 2003. These exemplary

disclosures also apply to U.S. Patent Pub. No. 2005/0272159 ("Ismagilov 159"), Exhibit B, which was published from the same patent application as Ismagilov 091 and contains the same disclosures.

172. Ismagilov 091 teaches, for example,

> A plug-forming region generally comprises a junction between a plug-fluid inlet and a channel containing the carrier-fluid such that plugs form which are substantially similar in size to each other and which have cross-sections which are substantially similar in size to the cross-section of the channel in the plug-forming region. In one embodiment, the substrate may contain a plurality of plug-forming regions.

Ismagilov 091 at 14:44-51; *see also* Ismagilov 159 ¶ 108.

173. Ismagilov 091 also teaches, for example,

> Suitable carrier-fluids include oils, preferably fluorinated oils. Examples include viscous fluids, such as perfluorodecaline or perfluoroperhydrophenanthrene; nonviscous fluids such as perfluorohexane; and mixtures thereof (which are particularly useful for matching viscosities of the carrier-fluids and plug-fluids). Commercially available fluorinated compounds such as Fluorinert™ liquids (3M, St. Paul, Minn.) can also be used.

Ismagilov 091 at 20:37-44; *see also* Ismagilov 159 ¶ 145.

174. Ismagilov 091 also teaches, for example,

> For example, fluorinated surfactants, such as those with a hydrophilic head group, are preferred when the carrier-fluid is a fluorinated fluid and the plug-fluid is an aqueous solution.

Ismagilov 091 at 20:64-67; *see also* Ismagilov 159 ¶ 147.

175. Ismagilov 091 also teaches, for example,

> Fluorosurfactants terminated with OEG-groups have been shown to demonstrate biocompatibility in blood substitutes and other biomedical applications. Preferably, oil-Soluble fluoroSurfactants terminated with oligoethylene groups are used to create interfaces in the microfluidic devices in certain applications. Surfactants with well-defined composition may be synthesized. This is preferably followed by the characterization of the formation of aqueous plugs in the presence of those surfactants. Their inertness towards nonspecific protein adsorption will also be characterized. FIG. 24 shows examples of fluorinated surfactants that form monolayers that are: resistant to protein adsorption; positively charged; and negatively charged. For OEG-terminated surfactants, high values of n (≧16) are preferred for making these surfactants oil-soluble and preventing them from

> entering the aqueous phase. In FIG. 24, compounds that have between about 3 to 6 EG units attached to a thiol are sufficient to prevent the adsorption of proteins to a monolayer of thiols on gold, and are thus preferred for inertness. In addition, surfactants that have been shown to be biocompatible in fluorocarbon blood substitutes may also be used as additives to fluorinated carrier fluids.

Ismagilov 091 at 37:23-44 (highlighting added); *see also* Ismagilov 159 ¶ 233.

176. Dr. Ismagilov, who is the first named inventor of Ismagilov 091, testified at trial in the District of Delaware, that the same sentence highlighted above in the previous paragraph was emphasizing the use of surfactants that are highly stable:

> Q. . . . Now, I've highlighted the sentence that says, For OEG-terminated surfactants high values of N, N greater than or equal to 16, are preferred for making these surfactants oily soluble and preventing them from entering the aqueous phase. Can you explain for the jury how this sentence that I've highlighted in the patent relates to the two features that we discussed in --
>
> A. Yes. So we're emphasizing that the longer fluorinated tails are preferred in this chemistry, and they would be useful for creating droplets, biological reactions with ***high stability*** and high performance.

Exhibit C [*Bio-Rad Laboratories, Inc. et al. v. 10X Genomics, Inc*., Civil Action 15-152-RGA (D. Del. Nov. 5, 2018), excerpt of the trial transcript to include Ismagilov 152 Case Trial Testimony] at 222:18-223:9 (emphasis added, discussing a patent related to Ismagilov 091 that shares the same specification passage).

177. Ismagilov 091 also teaches, for example,

> The merged plugs 122 may undergo further merging or undergo splitting, or they may be directed to other channels, channel branches, area, or region of the substrate where they may undergo one or more reactions or "treatments" such as one or more types of characterizations, measurements, detection, sorting, or analysis.

Ismagilov 091 at 27:58-64; *see also* Ismagilov 159 ¶ 180; *see also id.* ¶¶ 72, 186.

178. Ismagilov 091 also teaches, for example,

> Autocatalytic reactions present an exciting opportunity for highly sensitive detection of minute amounts of autocatalysts. Several systems are known to operate on this principle, silver-halide photography being the most widely used. In silver-halide photography, the energy of photons of light is used to decompose an

> emulsion of silver halide AgX into nanometer-sized particles of metallic silver. A film that is embedded with the silver particles is then chemically amplified by the addition of a metastable mixture of a soluble silver(I) salt and a reducing agent (hydroquinone). Metallic silver particles catalyze reduction of silver(I) by hydroquinone, leading to the growth of the initial silver particles. Another example of an autocatalytic reaction is the polymerase-chain reaction (PCR), which is a very effective amplification method that has been widely used in the biological sciences.

Ismagilov 091 at 45:57-46:5; *see also* Ismagilov 159 ¶ 276.

179. Ismagilov 091 further disclosed that "[t]he term 'detection region' refers to a part of or a location in a substrate or channel wherein a chemical is identified, measured, or sorted based on a predetermined property or characteristic." Ismagilov 091 at 7:61-64; *see also* Ismagilov 159 at ¶ 66. *See also, e.g.*, Ismagilov 091 at 20:60-67, 26:37-58, 37:5-17, 38:41-55, 51:49-52:4, Fig. 10A; Ismagilov 159 at ¶¶ 147, 174, 231, 239, 316, Fig. 10A.

180. On March 2, 2020, 10X served its Preliminary Invalidity Contentions, pursuant to Local Rule 16.6(d)(4) and the Pretrial Schedule (ECF No. 39), regarding invalidity of the asserted claims of the 444 Patent for failure to comply with the conditions for patentability, including, but not limited to, 35 U.S.C. §§ 101, 102, 103, and 112. 10X's investigation is ongoing. 10X reserves the right to revise, amend, or supplement its contentions concerning the invalidity of the asserted claims of the 444 Patent.

181. On June 24, 2020, 10X filed two petitions for *inter partes* review of *inter alia* the asserted claims of the 444 Patent before the United States Patent and Trademark Office, Patent Trial and Appeal Board ("PTAB"), which have been assigned Case Numbers IPR2020-01180 and IPR2020-01181 ("444 IPR Petitions").

182. As described in IPR2020-01180, the asserted claims of the 444 Patent are invalid under Section 102 and/or 103 in view of prior art references including, but not limited to, U.S. Patent No. 7,129,091 B2 to Ismagilov et al., Exhibit A; Thorsen, Todd (2003) *Microfluidic technologies for high-throughput screening applications*, California Institute of Technology,

Exhibit I; U.S. Patent App. Pub. No. 2004/0180346 A1 to Anderson et al., Exhibit J; U.S. Patent No. 7,323,305 to Leamon et al., Exhibit K; and U.S. Patent Application Publication No. 2005/0032240 to Lee and Tan, Exhibit L.

183. As described in IPR2020-01181, the asserted claims of the 444 Patent are invalid under Section 102 and/or 103 in view of prior art references including, but not limited to, U.S. Patent No. 9,857,303, Exhibit M; U.S. Patent Pub. No. 2006/0154298, Exhibit N; Sepp, A., Tawfik, D. S., Griffiths, A. D., Microbead display by in vitro compartmentalisation: selection for binding using flow cytometry, FEBS Letters 532, 455–458 (2002), Exhibit D; Thorsen, T., Roberts, R. W., Arnold, F. H., and Quake, S. R. (2001) Dynamic pattern formation in a vesicle-generating microfluidic device. Phys. Rev. Letts., 86, 4163-66., Exhibit O ("Thorsen 2001"); U.S. Patent No. 7,323,305, Exhibit K; and U.S. Patent App. Pub. No. 2005/0032240 to Lee and Tan, Exhibit L.

184. The asserted claims of the 444 Patent are invalid for at least the reasons stated in 10X's 444 IPR Petitions and 10X's Preliminary Invalidity Contentions (and any amendment or supplementation thereof).10X is informed and believes, and on that basis alleges, that Counterclaim Defendants contend that the 444 Patent is valid and enforceable.

185. At least the asserted claims 1, 2, 4 and 8 of the 444 Patent are also invalid because of incorrect inventorship pursuant to §§ 101 and 102(f). Darren Link's testimony under oath establishes conclusively that neither he nor his named coinventors are true inventors, and Ismagillov 091 anticipates Claims 1, 2, 4, and 8 of the 444 Patent. 10X incorporates herein its Tenth Affirmative Defense of Inequitable Conduct in support.

186. Accordingly, a valid and justiciable controversy has arisen and exists between Counterclaim Defendants, Harvard and Bio-Rad, and 10X with respect to the validity of the 444 Patent. 10X desires a judicial determination and declaration of the respective rights and duties of

the parties herein. Such a determination and declaration is necessary and appropriate at this time so that the parties may ascertain their respective rights and duties.

187. 10X is entitled to a declaratory judgment that the claims of the 444 Patent are invalid.

COUNT X
(Declaratory Judgment of Unenforceability of U.S. Patent No. 8,871,444)

188. 10X restates and incorporates by reference the denials, admissions, allegations, and Affirmative Defenses contained in its Answer and Second Amended Counterclaims above as if fully set forth herein. 10X further restates and incorporates by reference their allegations in paragraphs 152 through 187 of its Declaratory Judgment Counterclaims.

189. 10X incorporates as if fully restated herein its Tenth Affirmative Defense of Inequitable Conduct.

190. Accordingly, a valid and justiciable controversy has arisen and exists between Counterclaim Defendants, Bio-Rad and Harvard, and 10X with respect to the unenforceability of the 444 Patent. 10X desires a judicial determination and declaration of the respective rights and duties of the parties herein. Such a determination and declaration is necessary and appropriate at this time so that the parties may ascertain their respective rights and duties.

191. 10X is entitled to a declaratory judgment that the claims of the 444 Patent are unenforceable.

COUNT XI
(Declaratory Judgment of Non-Infringement of U.S. Patent No. 9,919,277)

192. 10X restates and incorporates by reference the denials, admissions, allegations, and Affirmative Defenses contained in its Answer and Second Amended Counterclaims above as if fully set forth herein. 10X further restates and incorporates by reference its allegations in paragraphs 152 through 191 of its Declaratory Judgment Counterclaims.

193. In their Complaint, Counterclaim Defendants have expressly accused 10X of infringing the 277 Patent.

194. 10X has not been and is not now infringing, directly or indirectly, literally or under the doctrine of equivalents, or willfully any valid and enforceable claim of the 277 Patent.

195. 10X does not infringe any valid and enforceable claim of the 277 Patent at least because neither 10X nor anyone else has used or uses 10X's Next GEM or GEM products to practice each and every step of the method of the only independent claim of the 277 Patent, claim 1. For example, neither 10X nor anyone else used or uses 10X's Next GEM or GEM products such that (1) the "microcapsules" are "aqueous" and that "a portion of the plurality of microcapsules contact each other but do not fuse with each other," (2) "a genetic element [is] linked covalently or non-covalently to a bead" when the "droplet generator [] produce[s], under microfluidic control, a plurality of aqueous microcapsules", and (3) "a genetic element [is] linked covalently or non-covalently to a bead" when "the enzymatic reaction" is "conduct[ed] … on the genetic element of at least one of the plurality of microcapsules".

196. Additionally, each of the claims of the 277 Patent is invalid and unenforceable as set forth below in Counts XIII and XIV of 10X's Declaratory Judgment Counterclaims. An invalid claim cannot be infringed.

197. In light of the Complaint against 10X, there exists an actual controversy between Counterclaim Defendants and 10X regarding the 277 Patent. Accordingly, a valid and justiciable controversy has arisen and exists between Counterclaim Defendants, Harvard and Bio-Rad, and 10X with respect to the alleged infringement of the 277 Patent. 10X desires a judicial determination and declaration of the respective rights and duties of the parties herein. Such a determination and

declaration is necessary and appropriate at this time so that the parties may ascertain their respective rights and duties.

198. 10X is entitled to a declaratory judgment that: (a) it has not infringed, and is not infringing, literally or under the doctrine of equivalents, directly or indirectly, any valid and enforceable claim of the 277 Patent, and (b) it is not liable for any alleged infringement of the 277 Patent.

COUNT XII
(Declaratory Judgment of Invalidity of U.S. Patent No. 9,919,277)

199. 10X restates and incorporates by reference the denials, admissions, allegations, and Affirmative Defenses contained in its Answer and Second Amended Counterclaims above as if fully set forth herein. 10X further restates and incorporates by reference their allegations in paragraphs 152 through 198 of its Declaratory Judgment Counterclaims.

200. 10X contends that the claims of the 277 Patent are invalid for failure to comply with the conditions for patentability, including, but not limited to, 35 U.S.C. §§ 101, 102, 103, and/or 112, especially in light of the scope of Plaintiffs' current infringement allegations.

201. On March 2, 2020, 10X served its Preliminary Invalidity Contentions, pursuant to Local Rule 16.6(d)(4) and the Pretrial Schedule (ECF No. 39), regarding invalidity of the asserted claims 1-6, 8, 9, 11, 13, and 14 of the 277 Patent ("asserted claims of the 277 Patent") for failure to comply with the conditions for patentability, including, but not limited to, 35 U.S.C. §§ 101, 102, 103, and 112. 10X's investigation is ongoing. 10X reserves the right to revise, amend, or supplement its contentions concerning the invalidity of the asserted claims of the 277 Patent.

202. As one example, the asserted claims of the 277 Patent are invalid under Section 102 and/or 103 in view of prior art references including, but not limited to, U.S. Patent No. 7,129,091 B2 to Ismagilov et al., Exhibit A; Thorsen, Todd (2003) *Microfluidic technologies for high-*

throughput screening applications, California Institute of Technology, Exhibit I; U.S. Patent App. Pub. No. 2007/0077572 A1 to Tawfik et al. ("Tawfix 572"), Exhibit P; U.S. Patent No. 7,323,305 to Leamon et al., Exhibit K; and U.S. Patent Application Publication No. 2005/0032240 to Lee and Tan, Exhibit L.

203. As a further example, the asserted claims 4 and 14 of the 277 Patent are invalid under at least 35 U.S.C. § 103, as described above and further in view of at least U.S. Patent App. Pub. No. 2007/0077572 A1 to Tawfik et al. ("Tawfik 572"), Exhibit P. Tawfik 572 is entitled to at least the priority date of November 24, 2003.

204. Tawfik 572 teaches, for example,

> As used herein, a "genetic element" is a molecule, a molecular construct or a cell comprising a nucleic acid. The genetic elements of the present invention may comprise any nucleic acid (for example, DNA, RNA or any analogue, natural or artificial, thereof). The nucleic acid component of the genetic element may moreover be linked, covalently or non-covalently, to one or more molecules or structures, including proteins, chemical entities and groups, solid-phase supports such as magnetic beads, and the like. In the methods of the invention, these structures or molecules can be designed to assist in the sorting and/or isolation of the genetic element encoding a gene product with the desired activity. It is further to be understood that the genetic elements of the present invention may be present within a cell, virus or phage.

Tawfik 572 ¶ 106.

205. Tawfik 572 also teaches, for example,

> The term "expression" as used herein, is used in its broadest meaning, to signify that a nucleic acid contained in the genetic element is converted into its gene product. Thus, where the nucleic acid is DNA, expression refers to the transcription of the DNA into RNA; where this RNA codes for protein, expression may also refer to the translation of the RNA into protein. Where the nucleic acid is RNA, expression may refer to the replication of this RNA into further RNA copies, the reverse transcription of the RNA into DNA and optionally the transcription of this DNA into further RNA molecule(s), as well as optionally the translation of any of the RNA species produced into protein. Preferably, therefore, expression is performed by one or more processes selected from the group consisting of transcription, reverse transcription, replication and translation.

Tawfik 572 ¶ 107.

206. Tawfik 572 also teaches, for example,

> Expression of the genetic element may thus be directed into either DNA, RNA or protein, or a nucleic acid or protein containing unnatural bases or amino acids (the gene product) within the droplet of the invention, so that the gene product is confined within the same droplet as the genetic element.

Tawfik 572 ¶ 108.

207. Tawfik 572 also teaches, for example,

> A "genetic element" in accordance with the present invention is as described above. Preferably, a genetic element is a molecule or construct selected from the group consisting of a DNA molecule, an RNA molecule, a partially or wholly artificial nucleic acid molecule consisting of exclusively synthetic or a mixture of naturally-occurring and synthetic bases, any one of the foregoing linked to a polypeptide, and any one of the foregoing linked to any other molecular group or construct. Advantageously, the other molecular group or construct may be selected from the group consisting of nucleic acids, polymeric substances, particularly beads, for example polystyrene beads, magnetic substances such as magnetic beads, labels, such as fluorophores or isotopic labels, chemical reagents, binding agents such as macrocycles and the like.

Tawfik 572 ¶ 153.

208. Tawfik 572 also teaches, for example,

> For the isolation of the desired cell components, the emulsion droplets may also carry microbeads coated either with oligonucleotides complementary to the nucleic acids one wishes to isolate (i.e., specific complementary sequence, if a particular nucleic acids needs to be isolated, or polyT if all mRNAs are to be isolated), or with antibodies specific against the protein, or proteins, of interest, or a combination of both. The number of cells and beads can be adjusted relative to the number of droplets so that the likelihood of having more than one cell per droplet is very low, and that all compartments, will contain, on average, one bead. In this case, most beads would carry no mRNAs or proteins, but those that do, would indeed represent a single cell.

Tawfik 572 ¶ 251.

209. Tawfik 572 also teaches, for example,

> The lysis reagents or buffers can contain a 'cocktail' of various inhibitors of RNases and proteinases to prevent the degradation of the analytes while the cells are broken and their contents processed. At the end of the lysis/capture, the emulsion can be broken and the microbeads isolated and rinsed to remove all cellular components apart from those DNA, RNA, or protein molecules that were specifically captured

> by the microbeads. Further processing of the microbeads depends on the particular analysis being performed.

Tawfik 572 ¶ 252.

210. Tawfik 572 also teaches, for example,

> The simplest analysis for the mRNA levels bound to the beads can be performed by addition of fluorescent oligonucleotides that are specific for the mRNA of interest. The amount of mRNA bound to the beads will be directly correlated to the level of fluorescence on the beads and can be sorted by FACS. Reverse transcription (RT) of mRNA can also be performed. This step can be performed in emulsion droplets to maintain the linkage between one cell and one microbead. The microbeads can then be isolated, rinsed and a PCR reaction performed in a new emulsion. The latter may use a set of oligonucleotides primers that are specific for the set of mRNAs that is being analyzed, with each oligonucleotide primer containing a different fluorescent probe. The PCR reaction can be preformed under conditions that ensure the linearity of amplification (no limiting number of primers, etc.) so that the relative number of fluorescent probes on the bead reflects the number of each mRNA type attached to it. Beads can be then analyzed by flow cytometry to enable the determination of the levels of mRNAs.

Tawfik 572 ¶ 253.

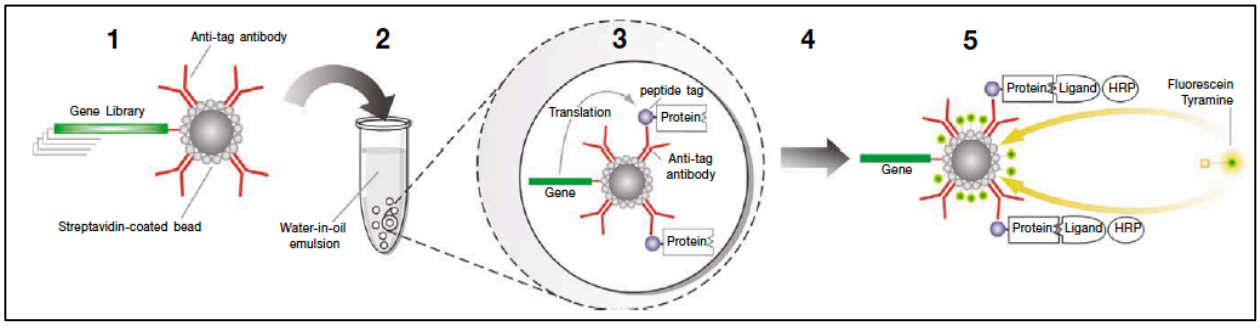
211. As another example, the asserted claims of the 277 Patent are invalid under Section 102 and/or 103 in view of prior art references including, but not limited to, U.S. Patent No. 9,857,303, Exhibit M; U.S. Patent Pub. No. 2006/0154298, Exhibit N; Sepp, A., Tawfik, D. S., Griffiths, A. D., Microbead display by in vitro compartmentalisation: selection for binding using flow cytometry, FEBS Letters 532, 455–458 (2002), Exhibit D; Thorsen, T., Roberts, R. W., Arnold, F. H., and Quake, S. R. Dynamic pattern formation in a vesicle-generating microfluidic device. Phys. Rev. Letts., 86, 4163-66 (2001), Exhibit O; U.S. Patent No. 7,323,305, Exhibit K; U.S. Patent App. Pub. No. 2007/0077572 A1 to Tawfik et al., Exhibit P; and U.S. Patent App. Pub. No. 2005/0032240, Exhibit L.

212. For example, the asserted claims of the 277 Patent are invalid under at least 35 U.S.C. § 103, in view of at least Sepp A, Tawfik DS, Griffiths AD, Microbead display by in vitro compartmentalisation: selection for binding using flow cytometry, FEBS Letters 532: 455–458

(2002) ("Sepp"), Exhibit D, and further in view of U.S. Patent No. 7,129,091 ("Ismagilov 091"), Exhibit A. These exemplary disclosures also apply to U.S. Patent Pub. No. 2005/0272159 ("Ismagilov 159") Exhibit B, which was published from the same patent application as Ismagilov 091 and contains the same disclosures. Sepp was published at least by 2002. Ismagilov 091 was filed May 9, 2003.

213. Sepp teaches, for example,

> A repertoire of genes encoding protein variants, each with a common N- or C-terminal epitope tag, are linked to streptavidin-coated beads carrying antibodies that bind the epitope tag at, on average, ≤1 gene per bead (1). The beads are compartmentalised in a water-in-oil emulsion to give, on average, <1 bead per compartment (2), and transcribed and translated in vitro in the compartments. Consequently, in each compartment, multiple copies of the translated protein become attached to the gene that encodes it via the bead (3). The emulsion is broken (4), and the microbeads carrying the display library isolated. The beads are incubated with ligand coupled to horseradish peroxidase (HRP), washed to remove unbound ligand and incubated with hydrogen peroxide and fluorescein tyramide (5). Immobilised HRP converts the fluorescein tyramide into a short-lived, free-radical intermediate which reacts with adjacent proteins. Hence, beads displaying proteins that bind ligand become labelled with multiple fluorescein molecules. These beads can then be enriched (together with the genes attached to them) by flow cytometry.



Sepp at 456, Fig. 1.

214. Ismagilov 091 teaches, for example,

> A plug-forming region generally comprises a junction between a plug-fluid inlet and a channel containing the carrier-fluid such that plugs form which are substantially similar in size to each other and which have cross-sections which are substantially similar in size to the cross-section of the channel in the plug-forming region. In one embodiment, the substrate may contain a plurality of plug-forming

regions.

Ismagilov 091 at 14:44-51; *see also* Ismagilov 159 ¶ 108.

215. Ismagilov 091 also teaches, for example,

> Suitable carrier-fluids include oils, preferably fluorinated oils. Examples include viscous fluids, such as perfluorodecaline or perfluoroperhydrophenanthrene; nonviscous fluids such as perfluorohexane; and mixtures thereof (which are particularly useful for matching viscosities of the carrier-fluids and plug-fluids). Commercially available fluorinated compounds such as Fluorinert™ liquids (3M, St. Paul, Minn.) can also be used.

Ismagilov 091 at 20:37-44; *see also* Ismagilov 159 ¶ 145.

216. Ismagilov 091 also teaches, for example,

> For example, fluorinated surfactants, such as those with a hydrophilic head group, are preferred when the carrier-fluid is a fluorinated fluid and the plug-fluid is an aqueous solution.

Ismagilov 091 at 20:64-67; *see also* Ismagilov 159 ¶ 147.

217. Ismagilov 091 also teaches, for example,

> Fluorosurfactants terminated with OEG-groups have been shown to demonstrate biocompatibility in blood substitutes and other biomedical applications. Preferably, oil-Soluble fluorosurfactants terminated with oligoethylene groups are used to create interfaces in the microfluidic devices in certain applications. Surfactants with well-defined composition may be synthesized. This is preferably followed by the characterization of the formation of aqueous plugs in the presence of those surfactants. Their inertness towards nonspecific protein adsorption will also be characterized. FIG. 24 shows examples of fluorinated surfactants that form monolayers that are: resistant to protein adsorption; positively charged; and negatively charged. For OEG-terminated surfactants, high values of n (≧16) are preferred for making these surfactants oil-soluble and preventing them from entering the aqueous phase. In FIG. 24, compounds that have between about 3 to 6 EG units attached to a thiol are sufficient to prevent the adsorption of proteins to a monolayer of thiols on gold, and are thus preferred for inertness. In addition, surfactants that have been shown to be biocompatible in fluorocarbon blood substitutes may also be used as additives to fluorinated carrier fluids.

Ismagilov 091 at 37:23-44 (highlighting added); *see also* Ismagilov 159 ¶ 233.

218. Dr. Ismagilov, who is the first named inventor of Ismagilov 091, testified at trial in the District of Delaware, that the same sentence highlighted above in the previous paragraph was emphasizing the use of surfactants that are highly stable:

> Q. . . . Now, I've highlighted the sentence that says, For OEG-terminated surfactants high values of N, N greater than or equal to 16, are preferred for making these surfactants oily soluble and preventing them from entering the aqueous phase. Can you explain for the jury how this sentence that I've highlighted in the patent relates to the two features that we discussed in --
>
> A. Yes. So we're emphasizing that the longer fluorinated tails are preferred in this chemistry, and they would be useful for creating droplets, biological reactions with ***high stability*** and high performance.

Exhibit C [*Bio-Rad Laboratories, Inc. et al. v. 10X Genomics, Inc*., Civil Action 15-152-RGA (D. Del. Nov. 5, 2018) Ismagilov 152 Case Trial Testimony] at 222:18-223:9 (emphasis added, discussing a patent related to Ismagilov 091 that shares the same specification passage), Exhibit C (excerpted).

219. Ismagilov 091 also teaches, for example,

> The merged plugs 122 may undergo further merging or undergo splitting, or they may be directed to other channels, channel branches, area, or region of the substrate where they may undergo one or more reactions or "treatments" such as one or more types of characterizations, measurements, detection, sorting, or analysis.

Ismagilov 091 at 27:58-64; *see also* Ismagilov 159 ¶ 180; *see also id.* ¶¶ 72, 186.

220. Ismagilov 091 also teaches, for example,

> Autocatalytic reactions present an exciting opportunity for highly sensitive detection of minute amounts of autocatalysts. Several systems are known to operate on this principle, silver-halide photography being the most widely used. In silver-halide photography, the energy of photons of light is used to decompose an emulsion of silver halide AgX into nanometer-sized particles of metallic silver. A film that is embedded with the silver particles is then chemically amplified by the addition of a metastable mixture of a soluble silver(I) salt and a reducing agent (hydroquinone). Metallic silver particles catalyze reduction of silver(I) by hydroquinone, leading to the growth of the initial silver particles. Another example of an autocatalytic reaction is the polymerase-chain reaction (PCR), which is a very effective amplification method that has been widely used in the biological sciences.

Ismagilov 091 at 45:57-46:5; *see also* Ismagilov 159 ¶ 276.

221. For example, the asserted claims are invalid under § § 102 and/or 103 in view of U.S. Patent No. 9,857,303 ("Griffiths 303") and U.S. Patent Pub. No. 2006/0154298 ("Griffiths-298"). Griffiths 303 discloses a droplet generator under microfluidic control. Griffiths 303 describes that "compound libraries can be compartmentalized in highly monodisperse microcapsules produced using ***microfluidic techniques***." *See* Griffiths 303 at 5:12-14 (emphasis added). Griffiths 303 and the 444 Patent also contain substantially the same disclosures concerning droplet generation using microfluidic techniques:

Griffiths	**444 Patent**
Highly monodisperse microcapsules can be produced using microfluidic techniques. For example, water-in-oil emulsions with less than 3% polydispersity can be generated by droplet break off in a co-flowing steam of oil (Umbanhowar et al., 2000). Microfluidic systems can also be used for laminar-flow of aqueous microdroplets dispersed in a stream of oil in microfluidic channels (Thorsen et al., 2001). This allows the construction of microfluidic devices for flow analysis and, optionally, flow sorting of microdroplets (Fu et al., 2002). Griffiths 303 at 13:31-40	Highly monodisperse microcapsules can be produced using microfluidic techniques. For example, water-in-oil emulsions with less than 1.5% polydispersity can be generated by droplet break off in a co-flowing steam of oil (Umbanhowar et al., 2000). Microfluidic systems can also be used for laminar-flow of aqueous microdroplets dispersed in a stream of oil in microfluidic channels (Thorsen et al., 2001). This allows the construction of microfluidic devices for flow analysis and, optionally, flow sorting of microdroplets (Fu et al., 2002). 444 Patent at 25:64-26:6

222. As another example, Griffiths 303 discloses the use of fluorinated oil comprising fluorinated surfactant:

> The emulsion may be stabilised by addition of one or more surface-active agents (surfactants). These surfactants are termed emulsifying agents and act at the water/oil interface to prevent (or at least delay) separation of the phases. Many oils and many emulsifiers can be used for the generation of water-in-oil emulsions; a recent compilation listed over 16,000 surfactants, many of which are used as emulsifying agents (Ash and Ash, 1993). Suitable oils include light white mineral oil and decane. Suitable surfactants include: non-ionic surfactants (Schick, 1966) such as sorbitan monooleate (Span™ 80; ICI), sorbitan monostearate (Span™ 60; ICI), polyoxyethylenesorbitan monooleate (Tween™ 80; ICD, and

> octylphenoxyethoxyethanol (Triton X-100); ionic surfactants such as sodium cholate and sodium taurocholate and sodium deoxycholate; chemically inert silicone-based surfactants such as polysiloxane-polycetyl-polyethylene glycol copolymer (Cetyl Dimethicone Copolyol) (e.g. Abi^{TM} EM90; Goldschmidt); and cholesterol.
>
> Emulsions with a fluorocarbon (or perfluorocarbon) continuous phase (Krafft et al., 2003; Riess, 2002) may be particularly advantageous. For example, stable water-in-perfluorooctyl bromide and water-in-perfluorooctylethane emulsions can be formed using F-alkyl dimorpholinophosphates as surfactants (Sadder et al., 1996). Non-fluorinated compounds are essentially insoluble in fluorocarbons and perfluorocarbons (Curran, 1998; Hildebrand and Cochran, 1949; Hudlicky, 1992; Scott, 1948; Studer et al., 1997) and small drug-like molecules (typically <500 Da and Log P<5) (Lipinski et al., 2001) are compartmentalised very effectively in the aqueous microcapsules of water-in-fluorocarbon and water-in-perfluorocarbon emulsions—with little or no exchange between microcapsules.

Griffiths 303 at 12:21-52. This disclosure is substantially the same to that included in the specification of the 444 Patent, further demonstrating that Griffiths 303 discloses the claimed fluorinated oil and fluorinated surfactant. *Compare*, Griffiths 303 at 12:21-52, *with* 444 Patent at 18:16-47.

223. Griffiths 303 also itself claims aqueous microdroplets comprising "non-fluorinated nucleic acids," a "biological target enzyme that is reactive with one or more of the nucleic acids" (an enzyme), and a "fluorogenic substrate of the biological target enzyme" (reagents for the enzymatic reaction). Griffiths 303 at Claim 1; *see also id.*, Claim 7 (similar), Claim 4 ("structurally different" "biological target enzyme[s]"). As an example, Griffiths teaches that "compounds" can include "nucleic acids:"

> The term "compound" is used herein in accordance with the meaning normally assigned thereto in the art. The term compound is used in its broadest sense i.e. a substance comprising two or more elements in fixed proportions, including molecules and supramolecular complexes. This definition includes small molecules (typically <500 Daltons) which make up the majority of pharmaceuticals. However, the definition also includes larger molecules, including polymers, for example polypeptides, ***nucleic acids*** and carbohydrates, and supramolecular complexes thereof.

****

> A "desired activity", as referred to herein, is the modulation of any activity of a target, or an activity of a molecule which is influenced by the target, which is modulatable directly or indirectly by a compound or compounds as assayed herein. The activity of the target may be any measurable biological or chemical activity, including binding activity, ***an enzymatic activity***, an activating or inhibitory activity on a third enzyme or other molecule, the ability to cause disease or influence metabolism or other functions; and the like. Activation and inhibition, as referred to herein, denote the increase or decrease of a desired activity 1.5 fold, 2 fold, 3 fold, 4 fold, 5 fold, 10 fold, 100 fold or more. Where the modulation is inactivation, the inactivation can be substantially complete inactivation.

Griffiths 303 at 8:58-67, 9:51-64 (emphasis added).

224. Griffiths 303 also discloses "[c]omplicated biochemical processes, notably gene transcription and translation" in aqueous microcapsules, which "has enabled compartmentalisation in water-in-oil emulsions to be used for the selection of genes [genetic element], which are transcribed and translated [enzymatic reaction requiring reagents] in emulsion microcapsules and selected by the binding or catalytic activities of the proteins they encode." Griffiths 303 at 12:62-13:7. This disclosure is substantially the same as that included in the specification of the 444 Patent. 444 Patent at 18:58-19:3.

225. As another example, Griffiths 303 contains substantially the same or similar disclosures regarding droplet contents as that included in the specification of the 444 Patent:

(A) General Description The microcapsules of the present invention require appropriate physical properties to allow the working of the invention. First, to ensure that the compounds and the target may not diffuse between microcapsules, the contents of each microcapsule must be isolated from the contents of the surrounding microcapsules, so that there is no or little exchange of compounds and target between the microcapsules over the timescale of the experiment. However, the permeability of the microcapsules may be adjusted such that	(A) General Description The microcapsules of the present invention require appropriate physical properties to allow the working of the invention. First, to ensure that the genetic elements and gene products may not diffuse between microcapsules, the contents of each microcapsule are preferably isolated from the contents of the surrounding microcapsules, so that there is no or little exchange of the genetic elements and gene products between the microcapsules over the timescale of the experiment. However, the permeability of the microcapsules may be adjusted such that

reagents may be allowed to diffuse into and/or out of the microcapsules if desired.	reagents may be allowed to diffuse into and/or out of the microcapsules if desired.
. . .	. . .
Third, the formation and the composition of the microcapsules advantageously does not abolish the activity of the target.	Third, the formation and the composition of the microcapsules advantageously does not abolish the function of the machinery the expression of the genetic elements and the activity of the gene products.
Consequently, any microencapsulation system used preferably fulfils these three requirements. The appropriate system(s) may vary depending on the precise nature of the requirements in each application of the invention, as will be apparent to the skilled person.	Consequently, any microencapsulation system used preferably fulfils these three requirements. The appropriate system(s) may vary depending on the precise nature of the requirements in each application of the invention, as will be apparent to the skilled person.
A wide variety of microencapsulation procedures are available (see Benita, 1996) and may be used to create the microcapsules used in accordance with the present invention. Indeed, more than 200 microencapsulation methods have been identified in the literature (Finch, 1993).	A wide variety of microencapsulation procedures are available (see Benita, 1996) and may be used to create the microcapsules used in accordance with the present invention. Indeed, more than 200 microencapsulation methods have been identified in the literature (Finch, 1993).
. . .	
Enzyme-catalysed biochemical reactions have also been demonstrated in microcapsules generated by a variety of other methods. Many enzymes are active in reverse micellar solutions (Bru & Walde, 1991; Bru & Walde, 1993; Creagh et al., 1993; Haber et al., 1993; Kumar et al., 1989; Luisi & B., 1987; Mao & Walde, 1991; Mao et al., 1992; Perez et al., 1992; Walde et al., 1994; Walde et al., 1993; Walde et al., 1988) such as the AOT-isooctane-water system (Menger & Yamada, 1979).	Enzyme-catalysed biochemical reactions have also been demonstrated in microcapsules generated by a variety of other methods. Many enzymes are active in reverse micellar solutions (Bru & Walde, 1991; Bru & Walde, 1993; Creagh et al., 1993; Haber et al., 1993; Kumar et al., 1989; Luisi & B., 1987; Mao & Walde, 1991; Mao et al., 1992; Perez et al., 1992; Walde et al., 1994; Walde et al., 1993; Walde et al., 1988) such as the AOT-isooctane-water system (Menger & Yamada, 1979).
Microcapsules can also be generated by interfacial polymerisation and interfacial complexation (Whateley, 1996).	Microcapsules can also be generated by interfacial polymerisation and interfacial complexation (Whateley, 1996).

Microcapsules of this sort can have rigid, nonpermeable membranes, or semipermeable membranes. Semipermeable microcapsules bordered by cellulose nitrate membranes, polyamide membranes and lipid-polyamide membranes can all support biochemical reactions, including multienzyme systems (Chang, 1987; Chang, 1992; Lim, 1984). Alginate/polylysine microcapsules (Lim & Sun, 1980), which can be formed under very mild conditions, have also proven to be very biocompatible, providing, for example, an effective method of encapsulating living cells and tissues (Chang, 1992; Sun et al., 1992).	Microcapsules of this sort can have rigid, nonpermeable membranes, or semipermeable membranes. Semipermeable microcapsules bordered by cellulose nitrate membranes, polyamide membranes and lipid-polyamide membranes can all support biochemical reactions, including multienzyme systems (Chang, 1987; Chang, 1992; Lim, 1984). Alginate/polylysine microcapsules (Lim & Sun, 1980), which can be formed under very mild conditions, have also proven to be very biocompatible, providing, for example, an effective method of encapsulating living cells and tissues (Chang, 1992; Sun et al., 1992).
Non-membranous microencapsulation systems based on phase partitioning of an aqueous environment in a colloidal system, such as an emulsion, may also be used.	Non-membranous microencapsulation systems based on phase partitioning of an aqueous environment in a colloidal system, such as an emulsion, may also be used.
Preferably, the microcapsules of the present invention are formed from emulsions; heterogeneous systems of two immiscible liquid phases with one of the phases dispersed in the other as droplets of microscopic or colloidal size (Becher, 1957; Sherman, 1968; Lissant, 1974; Lissant, 1984).	Preferably, the microcapsules of the present invention are formed from emulsions; heterogeneous systems of two immiscible liquid phases with one of the phases dispersed in the other as droplets of microscopic or colloidal size (Becher, 1957; Sherman, 1968; Lissant, 1974; Lissant, 1984).
Emulsions may be produced from any suitable combination of immiscible liquids. Preferably the emulsion of the present invention has water (containing the biochemical components) as the phase present in the form of finely divided droplets (the disperse, internal or discontinuous phase) and a hydrophobic, immiscible liquid (an `oil`) as the matrix in which these droplets are suspended (the nondisperse, continuous or external phase). Such emulsions are termed `water-in-oil` (W/O). This has the advantage that the entire aqueous phase containing the biochemical components is compartmentalised in discreet droplets (the internal phase). The external phase, being a hydrophobic oil, generally contains none of the biochemical components and hence is	Emulsions may be produced from any suitable combination of immiscible liquids. Preferably the emulsion of the present invention has "water" (an aqueous liquid containing the biochemical components) as the phase present in the form of finely divided droplets (the disperse, internal or discontinuous phase) and a hydrophobic, immiscible liquid (an `oil`) as the matrix in which these droplets are suspended (the nondisperse, continuous or external phase). Such emulsions are termed `water-in-oil` (W/O). This has the advantage that the entire aqueous phase containing the biochemical components is compartmentalised in discreet droplets (the internal phase). The external phase, being a hydrophobic liquid, generally contains none of the biochemical components

inert.	and hence is inert.
The emulsion may be stabilised by addition of one or more surface-active agents (surfactants). These surfactants are termed emulsifying agents and act at the water/oil interface to prevent (or at least delay) separation of the phases. Many oils and many emulsifiers can be used for the generation of water-in-oil emulsions; a recent compilation listed over 16,000 surfactants, many of which are used as emulsifying agents (Ash and Ash, 1993). Suitable oils include light white mineral oil and decane. Suitable surfactants include: non-ionic surfactants (Schick, 1966) such as sorbitan monooleate (Span™80; ICI), sorbitan monostearate (Span™ 60; ICI), polyoxyethylenesorbitan monooleate (Tween™ 80; ICD, and octylphenoxyethoxyethanol (Triton X-100); ionic surfactants such as sodium cholate and sodium taurocholate and sodium deoxycholate; chemically inert silicone-based surfactants such as polysiloxane-polycetyl-polyethylene glycol copolymer (Cetyl Dimethicone Copolyol) (e.g. Abi1™EM90; Goldschmidt); and cholesterol.	The emulsion may be stabilised by addition of one or more surface-active agents (surfactants). These surfactants are termed emulsifying agents and act at the water/oil interface to prevent (or at least delay) separation of the phases. Many oils and many emulsifiers can be used for the generation of water-in-oil emulsions; a recent compilation listed over 16,000 surfactants, many of which are used as emulsifying agents (Ash and Ash, 1993). Suitable oils include light white mineral oil and decane. Suitable surfactants include: non-ionic surfactants (Schick, 1966) such as sorbitan monooleate (Span™ 80; ICI), sorbitan monosteatate (Span.TM. 60; ICI), polyoxyethylenesorbitan monooleate (Tween™ 80; ICI), and octylphenoxyethoxyethanol (Triton X-100); ionic surfactants such as sodium cholate and sodium taurocholate and sodium deoxycholate; chemically inert silicone-based surfactants such as polysiloxane-polycetyl-polyethylene glycol copolymer (Cetyl Dimethicone Copolyol) (e.g. Abi™ EM90; Goldschmidt); and cholesterol.
Emulsions with a fluorocarbon (or perfluorocarbon) continuous phase (Krafft et al., 2003; Riess, 2002) may be particularly advantageous. For example, stable water-in-perfluorooctyl bromide and water-in-perfluorooctylethane emulsions can be formed using F-alkyl dimorpholinophosphates as surfactants (Sadder et al., 1996). Non-fluorinated compounds are essentially insoluble in fluorocarbons and perfluorocarbons (Curran, 1998; Hildebrand and Cochran, 1949; Hudlicky, 1992; Scott, 1948; Studer et al., 1997) and small drug-like molecules (typically <500 Da and Log P<5) (Lipinski et al., 2001) are compartmentalised very effectively in the aqueous microcapsules of	Emulsions with a fluorocarbon (or perfluorocarbon) continuous phase (Krafft et al., 2003; Riess, 2002) may be particularly advantageous. For example, stable water-in-perfluorooctyl bromide and water-in-perfluorooctylethane emulsions can be formed using F-alkyl dimorpholinophosphates as surfactants (Sadtler et al., 1996). Non-fluorinated compounds are essentially insoluble in fluorocarbons and perfluorocarbons (Curran, 1998; Hildebrand and Cochran, 1949; Hudlicky, 1992; Scott, 1948; Studer et al., 1997) and small drug-like molecules (typically <500 Da and Log P<5) (Lipinski et al., 2001) are compartmentalised very effectively in the aqueous microcapsules of

water-in-fluorocarbon and water-in-perfluorocarbon emulsions--with little or no exchange between microcapsules.	water-in-fluorocarbon and water-in-perfluorocarbon emulsions--with little or no exchange between microcapsules.
. . .	. . .
Complicated biochemical processes, notably gene transcription and translation are also active in aqueous microcapsules formed in water-in-oil emulsions. This has enabled compartmentalisation in water-in-oil emulsions to be used for the selection of genes, which are transcribed and translated in emulsion microcapsules and selected by the binding or catalytic activities of the proteins they encode (Doi and Yanagawa, 1999; Griffiths and Tawfik, 2003; Lee et al., 2002; Sepp et al., 2002; Tawfik and Griffiths, 1998). This was possible because the aqueous microcapsules formed in the emulsion were generally stable with little if any exchange of nucleic acids, proteins, or the products of enzyme catalysed reactions between microcapsules.	Complicated biochemical processes, notably gene transcription and translation are also active in aqueous microcapsules formed in water-in-oil emulsions. This has enabled compartmentalisation in water-in-oil emulsions to be used for the selection of genes, which are transcribed and translated in emulsion microcapsules and selected by the binding or catalytic activities of the proteins they encode (Doi and Yanagawa, 1999; Griffiths and Tawfik, 2003; Lee et al., 2002; Sepp et al., 2002; Tawfik and Griffiths, 1998). This was possible because the aqueous microcapsules formed in the emulsion were generally stable with little if any exchange of nucleic acids, proteins, or the products of enzyme catalysed reactions between microcapsules.
The technology exists to create emulsions with volumes all the way up to industrial scales of thousands of liters (Becher, 1957; Sherman, 1968; Lissant, 1974; Lissant, 1984).	The technology exists to create emulsions with volumes all the way up to industrial scales of thousands of liters (Becher, 1957; Sherman, 1968; Lissant, 1974; Lissant, 1984).
The preferred microcapsule size will vary depending upon the precise requirements of any individual screening process that is to be performed according to the present invention. In all cases, there will be an optimal balance between the size of the compound library and the sensitivities of the assays to determine the identity of the compound and target activity.	The preferred microcapsule size will vary depending upon the precise requirements of any individual selection process that is to be performed according to the present invention. In all cases, there will be an optimal balance between gene library size, the required enrichment and the required concentration of components in the individual microcapsules to achieve efficient expression and reactivity of the gene products.
. . .	. . .
The size of emulsion microcapsules may be varied simply by tailoring the emulsion conditions used to form the emulsion	The size of emulsion microcapsules may be varied simply by tailoring the emulsion conditions used to form the emulsion

according to requirements of the screening system. The larger the microcapsule size, the larger is the volume that will be required to encapsulate a given compound library, since the ultimately limiting factor will be the size of the microcapsule and thus the number of microcapsules possible per unit volume.	according to requirements of the selection system. The larger the microcapsule size, the larger is the volume that will be required to encapsulate a given genetic element library, since the ultimately limiting factor will be the size of the microcapsule and thus the number of microcapsules possible per unit volume.
. . .	. . .
The selection of suitable encapsulation conditions is desirable. Depending on the complexity and size of the compound library to be screened, it may be beneficial to set up the encapsulation procedure such that one compound (or one or less than one microbead) is encapsulated per microcapsule. This will provide the greatest power of resolution. Where the library is larger and/or more complex, however, this may be impracticable; it may be preferable to encapsulate several compounds (or several microbeads) together and rely on repeated application of the method of the invention to identify the desired compound. A combination of encapsulation procedures may be used to identify the desired compound.	The selection of suitable encapsulation conditions is desirable. Depending on the complexity and size of the library to be screened, it may be beneficial to set up the encapsulation procedure such that 1 or less than 1 genetic element is encapsulated per microcapsule. This will provide the greatest power of resolution. Where the library is larger and/or more complex, however, this may be impracticable; it may be preferable to encapsulate several genetic elements together and rely on repeated application of the method of the invention to achieve sorting of the desired activity. A combination of encapsulation procedures may be used to obtain the desired enrichment.
Theoretical studies indicate that the larger the number of compounds created the more likely it is that a compound will be created with the properties desired (see (Perelson and Oster, 1979) for a description of how this applies to repertoires of antibodies). It has also been confirmed practically that larger phage-antibody repertoires do indeed give rise to more antibodies with better binding affinities than smaller repertoires (Griffiths et al., 1994). To ensure that rare variants are generated and thus are capable of being identified, a large library size is desirable. Thus, the use of optimally small microcapsules is beneficial.	Theoretical studies indicate that the larger the number of genetic element variants created the more likely it is that a molecule will be created with the properties desired (see Perelson and Oster, 1979 for a description of how this applies to repertoires of antibodies). Recently it has also been confirmed practically that larger phage-antibody repertoires do indeed give rise to more antibodies with better binding affinities than smaller repertoires (Griffiths et al., 1994). To ensure that rare variants are generated and thus are capable of being selected, a large library size is desirable. Thus, the use of optimally small microcapsules is beneficial.
The largest repertoires of compounds that can be screened in a single experiment to date,	The largest repertoire created to date using methods that require an in vivo step (phage-

using two dimensional microarrays of 1 nl volume spots, is ~10^3 (Hergenrother et al., 2000). Using the present invention, at a microcapsule diameter of 2.6 mm (Tawfik and Griffiths, 1998), by forming a three-dimensional dispersion, a repertoire size of at least 10^{11} can be screened using 1 ml aqueous phase in a 20 ml emulsion. In addition to the compounds, or microbeads coated with compounds, described above, the microcapsules according to the invention will comprise further components required for the screening process to take place. They will comprise the target and a suitable buffer. A suitable buffer will be one in which all of the desired components of the biological system are active and will therefore depend upon the requirements of each specific reaction system. Buffers suitable for biological and/or chemical reactions are known in the art and recipes provided in various laboratory texts, such as (Sambrook and Russell, 2001). Griffiths 303 at 10:58-15:30	display and Lad systems) has been a $1.6x10^{11}$ clone phage-peptide library which required the fermentation of 15 liters of bacteria (Fisch et al., 1996). SELEX experiments are often carried out on very large numbers of variants (up to 10^{15}). . . . In addition to the genetic elements described above, the microcapsules according to the invention will comprise further components required for the sorting process to take place. Other components of the system will for example comprise those necessary for transcription and/or translation of the genetic element. These are selected for the requirements of a specific system from the following; a suitable buffer, an in vitro transcription/replication system and/or an in vitro translation system containing all the necessary ingredients, enzymes and cofactors, RNA polymerase, nucleotides, nucleic acids (natural or synthetic), transfer RNAs, ribosomes and amino acids, and the substrates of the reaction of interest in order to allow selection of the modified gene product. A suitable buffer will be one in which all of the desired components of the biological system are active and will therefore depend upon the requirements of each specific reaction system. Buffers suitable for biological and/or chemical reactions are known in the art and recipes provided in various laboratory texts, such as Sambrook et al., 1989. 444 Patent at 16:58-23:60

226. Furthermore, Griffiths 303 also discloses using microbeads, and this disclosure is substantially the same as that included in the specification of the 444 Patent:

Griffiths	**444 Patent**

Microbeads, are also known by those skilled in the art as microspheres, latex particles, beads, or minibeads, are available in diameters from 20 nm to 1 mm and can be made from a variety of materials including silica and a variety of polymers, copolymers and terpolymers. Griffiths 303 at 8:40-44	Microbeads, are also known by those skilled in the art as microspheres, latex particles, beads, or minibeads, are available in diameters from 20 nm to 1 mm and can be made from a variety of materials including silica and a variety of polymers, copolymers and terpolymers. 444 Patent at 12:40-44
Microbeads can be "compartmentalised" in accordance with the present invention by distribution into microcapsules. For example, in a preferred aspect the microbeads can be placed in a water/oil mixture and emulsified to form a water-in-oil emulsion comprising microcapsules according to the invention. The concentration of the microbeads can be adjusted such that a single microbead, on average, appears in each microcapsule. Griffiths 303 at 8:50-57	Microbeads can be "compartmentalised" in accordance with the present invention by distribution into microcapsules. For example, in a preferred aspect the microbeads can be placed in a water/oil mixture and emulsified to form a water-in-oil emulsion comprising microcapsules according to the invention. The concentration of the microbeads can be adjusted such that a single microbead, on average, appears in each microcapsule. 444 Patent at 12:50-57
The term "microbead" is used herein in accordance with the meaning normally assigned thereto in the art and further described hereinbelow. Microbeads, are also known by those skilled in the art as microspheres, latex particles, beads, or minibeads, are available in diameters from 20 nm to 1 mm and can be made from a variety of materials including silica and a variety of polymers, copolymers and terpolymers. Highly uniform derivatised and non-derivatised nonmagnetic and paramagnetic microparticles (beads) are commercially available from many sources (e.g. Sigma, Bangs Laboratories, Luminex and Molecular Probes) (Fomusek and Vetvicka, 1986). Microbeads can be "compartmentalised" in accordance with the present invention by distribution into microcapsules. For example, in a preferred aspect the microbeads can be placed in a water/oil mixture and emulsified to form a water-in-oil emulsion comprising microcapsules according to the invention. The	The term "microbead" is used herein in accordance with the meaning normally assigned thereto in the art and further described hereinbelow. Microbeads, are also known by those skilled in the art as microspheres, latex particles, beads, or minibeads, are available in diameters from 20 nm to 1 mm and can be made from a variety of materials including silica and a variety of polymers, copolymers and terpolymers. Highly uniform derivatised and non-derivatised nonmagnetic and paramagnetic microparticles (beads) are commercially available from many sources (e.g. Sigma, Bangs Laboratories, Luminex and Molecular Probes) (Formusek and Vetvicka, 1986). Microbeads can be "compartmentalised" in accordance with the present invention by distribution into microcapsules. For example, in a preferred aspect the microbeads can be placed in a water/oil mixture and emulsified to form a water-in-oil emulsion comprising microcapsules according to the invention. The

concentration of the microbeads can be adjusted such that a single microbead, on average, appears in each microcapsule. Griffiths 303 at 8:38-57	concentration of the microbeads can be adjusted such that a single microbead, on average, appears in each microcapsule. 444 Patent at 12:38-57

227. In addition, Griffiths 303 discloses that "microbeads are analysed following ***pooling of the microcapsules into one or more common compartments***." Griffiths 303 at 5:60-62 (emphasis added), 6:28-30 (same), 16:61-64 (same), 18:32-35 (same), 20:33-36 (same). These disclosures of pooling are similar to those included in the specification of the 444 Patent. *E.g.*, 444 Patent at 6:7-9, 6:26-28, 7:11-14.

228. Griffiths 303 also discloses that:

> The change in the optical properties of the microcapsule may be due to modulation of the activity of the target by the compound. The compound may activate or inhibit the activity of the target. For example, **if the target is an enzyme, the substrate and the product of the reaction catalysed by the target can have different optical properties.** Advantageously, the substrate and product have different fluorescence properties.

Griffiths 303 at 3:18-26 (emphasis added).

229. In addition, Griffiths-298 contains identical or similar disclosures to Griffiths 303, including as shown by the following chart, and so anticipates and/or renders obvious the asserted claims of the 444 Patent for similar reasons:

Griffiths	Griffiths-298
1:26-41	[0003]
2:27-31	[0008]
3:6-26	[0069]-[0072]
3:27-44	[0076], [0080], [0107]
3:50-65	[0064]
5:12-37	[0035]
5:41-7:24	[0066]-[0075], [0077]
7:31-37	[0080]
8:20-67	[0091]-[0095]

9:41-64	[0102], [0103]
10:1-15:52	[0104]-[0145]
15:63-16:7	[0147]
16:14-32	[0149]
16:36-55	[0151]-[0155]
16:61-64	[0157]
17:32-51	[0161]-[0163]
18:32-35	[0173]
18:42-53	[0175]
19:1-3	[0177]
19:5-21:11	[0178]-[0195]
21:25-44	[0197]
21:46-50	[0198]
21:59-67	[0199]
22:1-23:45	[0200]-[0208]
24:16-39	[0225]
28:25-65	[0254]-[0255]
31:37-43	[0275]
35:38-40	[0385]
35:50-53	[0364]
36:15-17	[0374]
36:54-67	[0385]

230. In addition, Griffiths 303, Griffiths-298, and the 444 Patent share overlapping disclosures—including disclosures pertaining to droplet generation, fluorinated oil and fluorinated surfactant, contents of biochemical reactions in droplets, and several embodiments, which is further sows that Griffiths 303 and/or Griffiths-298 anticipate and/or render obvious the asserted claims of the 444 Patent. *Compare, e.g.*, 444 Patent, 5:61-6:45, 12:14-29, 12:38-57, 12:58-67, 13:1-17, 13:18-28, 13:29-51, 16:44-57, 16:58-17:3, 17:24-32, 17:33-37, 17:38-46, 17:47-62, 17:63-18:15, 18:16-33, 18:34-47, 18:58-19:3, 19:4-6, 19:7-15, 20:37-44, 21:38-48, 22:65-23:31, 23:38-40, 23:55-60, 25:64-26:6, 39:50-40:4, 40:25-30, 40:52-64, 41:19-46, 41:50-42:3, 42:4-42, 44:29-49, 44:51-54,

44:65-45:49, 45:50-46:54, 53:12-25, *with* Griffiths, 5:41-6:43, 8:20-35, 8:38-57, 9:41-50, 9:51-67, 10:1-12, 10:13-38, 10:44-57, 10:58-11:3, 11:9-17, 11:18-22, 11:43-51, 11:52-67, 12:1-20, 12:21-38, 12:39-52, 12:62-13:7, 13:8-11, 13:12-17, 13:18-25, 13:31-40, 14:46-15:11, 15:15-19, 15:24-30, 16:36-55, 17:32-38, 17:38-51, 19:5-22, 19:29-60, 20:7-27, 20:63-21:12, 21:25-44, 21:46-50, 22:1-54, 22:55-23:45, 28:25-38, *and* Griffiths-298, [0066]-[0068], [0091], [0093]-[0094], [0102], [0103], [0104], [0105]-[0106], [0108], [0109]-[0110], [0112]-[0113], [0114], [0117], [0118]-[0119], [0120]-[0121], [0122], [0123], [0126], [0127], [0128], [0129], [0131], [0139]-[0141], [0142], [0143], [0151]-[0155], [0161], [0162]-[0163], [0178]-[0180], [0182]-[0184], [0186], [0195], [0197], [0198], [0200]-[0205], [0206]-[0208], [0254]

231. Additionally, the asserted claims of the 277 Patent are invalid under Section 102 and/or 103 in view of prior art references including, but not limited to: U.S. Patent No. 7,129,091 B2 to Ismagilov et al. ("Ismagilov 091"), Exhibit A; U.S. Patent No. 7,323,305 to Leamon et al. ("Leamon"), Exhibit K; Thorsen, Todd (2003) Microfluidic technologies for high-throughput screening applications, California Institute of Technology ("Thorsen"), Exhibit I; U.S. Patent App. Pub. No. 2007/0077572 A1 to Tawfik et al. ("Tawfik"), Exhibit P; Japanese Patent Application Publication JPA2003-153692 to Mizuno et al. ("Mizuno"), Exhibit Q; U.S. Patent Application Publication No. 2005/0032240 to Lee and Tan ("Lee"), Exhibit L; Sepp, A., Tawfik, D. S., Griffiths, A. D., Microbead display by in vitro compartmentalisation: selection for binding using flow cytometry, FEBS Letters 532, 455–458 (2002) ("Sepp"), Exhibit D; U.S. Patent No. 9,857,303 to Griffiths et al. ("Griffiths 303"), Exhibit M; Thorsen, T., Roberts, R. W., Arnold, F. H., and Quake, S. R., Dynamic pattern formation in a vesicle-generating microfluidic device. Phys. Rev. Letts., 86, 4163-66 (2001) ("Thorsen-2001"), Exhibit O; U.S. Patent Pub. No. 2006/0154298 to Griffiths et al. ("Griffiths-298"), Exhibit N.

232. For example, at least the following specific combinations render one or more of the asserted claims of the 277 Patent anticipated or obvious: Ismagilov 091 & Leamon, Ismagilov 091 & Leamon & Thorsen, Ismagilov 091 & Leamon & Tawfik, Ismagilov 091 & Leamon & Mizuno, Ismagilov 091 & Leamon & Thorsen & Tawfik, Ismagilov 091 & Leamon & Thorsen & Mizuno, Ismagilov 091 & Leamon & Lee, Ismagilov 091 & Leamon & Thorsen & Lee, Ismagilov 091 & Sepp, Ismagilov 091 & Sepp & Thorsen, Ismagilov 091 & Sepp & Tawfik, Ismagilov 091 & Sepp & Mizuno, Ismagilov 091 & Sepp & Thorsen & Tawfik, Ismagilov 091 & Sepp & Thorsen & Mizuno, Ismagilov 091 & Sepp & Lee, Ismagilov 091 & Sepp & Thorsen & Lee, Griffiths 303, Griffiths 303 & Thorsen-2001, Griffiths 303 & Thorsen-2001 & Sepp, Griffiths 303 & Thorsen-2001 & Leamon, Griffiths 303 & Thorsen-2001 & Leamon & Tawfik, Griffiths 303 & Thorsen-2001 & Leamon & Mizuno, Griffiths 303 & Sepp & Lee, Griffiths 303 & Leamon & Lee, Griffiths-298, Griffiths-298 & Thorsen-2001, Griffiths-298 & Thorsen-2001 & Sepp, Griffiths-298 & Thorsen-2001 & Leamon, Griffiths-298 & Thorsen-2001 & Leamon & Tawfik, Griffiths-298 & Thorsen-2001 & Leamon & Mizuno, Griffiths-298 & Sepp & Lee, and Griffiths-298 & Leamon & Lee.

233. The asserted claims of the 277 Patent are invalid for at least the reasons stated in 10X's Preliminary Invalidity Contentions (and any amendment or supplementation thereof).

234. 10X is informed and believes, and on that basis alleges, that Counterclaim Defendants contend that the 277 Patent is valid and enforceable.

235. Accordingly, a valid and justiciable controversy has arisen and exists between Counterclaim Defendants, Harvard and Bio-Rad, and 10X with respect to the validity of the 277 Patent. 10X desires a judicial determination and declaration of the respective rights and duties of

the parties herein. Such a determination and declaration is necessary and appropriate at this time so that the parties may ascertain their respective rights and duties.

236. 10X is entitled to a declaratory judgment that the claims of the 277 Patent are invalid.

COUNT XIII
(Declaratory Judgment of Unenforceability of U.S. Patent No. 9,919,277)

237. 10X restates and incorporates by reference the denials, admissions, allegations, and Affirmative Defenses contained in its Answer and Second Amended Counterclaims above as if fully set forth herein. 10X further restates and incorporates by reference their allegations in paragraphs 152 through 236 of its Declaratory Judgment Counterclaims.

238. 10X incorporates as if fully restated herein its Tenth Affirmative Defense of Inequitable Conduct.

239. Accordingly, a valid and justiciable controversy has arisen and exists between Counterclaim Defendants, Bio-Rad and Harvard, and 10X with respect to the unenforceability of the 277 Patent. 10X desires a judicial determination and declaration of the respective rights and duties of the parties herein. Such a determination and declaration is necessary and appropriate at this time so that the parties may ascertain their respective rights and duties.

240. 10X is entitled to a declaratory judgment that the claims of the 277 Patent are unenforceable.

III. PATENT INFRINGEMENT COUNTERCLAIMS

Counterclaim Plaintiff 10X Genomics, Inc. ("10X") and Counterclaim Plaintiff as to certain claims President and Fellows of Harvard College ("Harvard") hereby allege for their counterclaims for patent infringement against Bio-Rad Laboratories, Inc. ("Bio-Rad" or

"Counterclaim Defendant") on personal knowledge as to its own actions and on information and belief as to the action of others.

241. This is an action for infringement of United States Patent Nos. 9,029,085 (the "085 Patent") and 9,850,526 (the "526 Patent") (collectively, the "10X Asserted Patents"). This action arises under the patent laws of the United States, Title 35, United States Code, including 35 U.S.C. § 271.

THE PARTIES

242. 10X is a Delaware corporation with its principal place of business at 6230 Stoneridge Mall Road, Pleasanton, CA 94588.

243. Bio-Rad is a Delaware corporation with its principal place of business at 1000 Alfred Nobel Drive, Hercules, CA 94547.

244. Bio-Rad makes, uses, sells, offers to sell, exports, and/or imports into the United States products, services, and components that have been and are used to infringe one or more claims of the 10X Asserted Patents, actively induces infringement by others of the 10X Asserted Patents, and/or contributes to the infringement by others of the 10X Asserted Patents. 10X seeks *inter alia* monetary damages and prejudgment interest for Bio-Rad's unauthorized and unlawful acts of infringement.

245. Harvard is a Massachusetts educational institution with a principal place of business at 1563 Massachusetts Avenue, Cambridge, Massachusetts 02138. Harvard is a patent owner and licensor for the 10X Asserted Patents. The parties have stipulated to aligning Harvard as counterclaim plaintiff in this action as to these patent infringement counterclaims against Bio-Rad. ECF No. 112.

JURISDICTION AND VENUE

246. This civil action for patent infringement arises under the patent laws of the United States, 35 U.S.C. §§ 1 et seq., including in particular under 35 U.S.C. § 271. This Court has subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331 and 1338(a).

247. This Court has personal jurisdiction over Bio-Rad. Bio-Rad has substantial contacts with the forum as a consequence of conducting business in the Commonwealth of Massachusetts. Bio-Rad has committed, induced, contributed to, controlled, and/or participated in acts of infringement of the 10X Asserted Patents within this District, including without limitation past acts of infringement, and continues to commit, induce, contribute to, control, and/or participate in acts of infringement. Moreover, Bio-Rad has substantial contacts with the forum as a consequence of conducting business in the Commonwealth of Massachusetts.

248. The Court has personal jurisdiction over Bio-Rad for these counterclaims because Bio-Rad has submitted to the jurisdiction of the Court—both in the instant action and in *Bio-Rad Labs., Inc. v. Still Techs., Inc.*, DMA-1-19-cv-11587—and because Bio-Rad has committed and continues to commit acts and/or omissions related to these patent counterclaims in this District including Bio-Rad's filing of the present lawsuit itself.

249. Venue is proper in this Court under 28 U.S.C. §§ 1391 and 1400(b). Bio-Rad has committed, induced, contributed to, controlled, and/or participated in acts of infringement, and continues to commit, induce, contribute to, control, and/or participate in acts of infringement, including without limitation development and testing of the accused products, of the 10X Asserted Patents within the Commonwealth of Massachusetts. For example, Bio-Rad has collaborated and continues to collaborate with Jason Buenrostro—a Broad Fellow of the Broad Institute of MIT and Harvard University—within the Commonwealth of Massachusetts to develop Bio-Rad's ATAC-seq products that infringe the 10X Asserted Patents. On September 19, 2018, Bio-Rad announced

its release of a single-cell ATAC-seq solution that is based on its collaboration with Dr. Buenrostro.[1] On information and belief, Bio-Rad collaborates with, induces, and contributes to Jason Buenrostro's practice of Bio-Rad's ATAC-seq with nuclei workflow within the Commonwealth. Bio-Rad has a regular and established place of business in the Commonwealth of Massachusetts, including without limitation because it has established in the Commonwealth dedicated Bio-Rad Supply Centers.[2] For example, on information and belief, Bio-Rad owns, operates, maintains, and stocks Bio-Rad Supply Centers at Massachusetts General Hospital in Boston, University of Massachusetts Medical School in Worcester, Children's Hospital in Boston, and Cell Signaling Technology in Danvers.[3] On information and belief, Bio-Rad required that it oversee the installation of the Supply Center in each of those locations (and on information and belief also requires overseeing any reinstallation or removal), monitors and maintains the inventory of Bio-Rad supplies through Bio-Rad-provided and operated software, and provides direct technical support to customers while they are visiting the Massachusetts Supply Centers. The appliances at the Supply Centers are large, immovable pieces of equipment such as a modular freezer, refrigerator, freezer, or ambient unit with locked doors and a touch-screen computer to operate Bio-Rad's software. Bio-Rad employees or agents make routine visits to the Supply Centers to check on and re-stock the inventory, and during those visits are on site and conducting business at the Supply Center. On information and belief, Bio-Rad has a license to occupy and use designated spaces in

[1] https://www.bio-rad.com/en-us/life-science-research/news/bio-rad-launches-its-scatac-seq-solution?vertical=LSR&&ID=Bio-Rad-Launches-its_1561504974
[2] *See, generally,* https://www.bio-rad.com/en-us/life-science-research/purchase-service-programs/supply-center-program?ID=1383773882551
[3] *See* https://isurvey.bio-rad.com/isupply17Kiosk/admin/BioRadPriceList.jsp?_ga=2.74382546.1378527774.1580765011-1852606701.1578621874

each of these locations, and each Supply Center occupies an established, physical and geographic location that is set apart from the rest of the facility for the exclusive purpose of Bio-Rad selling its products to its customers. To buy products through the Supply Center, a customer at the Supply Center uses the software at the Center to place an order, pays Bio-Rad through purchase order or credit card, and opens the Supply Center when it unlocks to obtain the products. To return a product that a customer mistakenly purchased, the customer directly calls a Bio-Rad representative before returning the item to the same Supply Center. Bio-Rad advertises these Supply Centers on its website as locations where Bio-Rad supplies are available for purchase and customers are enabled to register and make and pick up their purchases. On information and belief, the Supply Centers are branded with Bio-Rad's logo, and information is provided at that location for contacting Bio-Rad's sales and services representatives. Venue is also independently proper in this district because Bio-Rad is subject to personal jurisdiction in this district, has voluntarily submitted itself to and availed itself of the jurisdiction of this Court and, under the circumstances of this action, has waived any objection to venue over these patent infringement claims in this district.

BACKGROUND AND THE 10X ASSERTED PATENTS

250. On May 12, 2015, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 9,029,085, entitled "Assays and Other Reactions Involving Droplets." U.S. Application No. 12/529,926, from which the 085 Patent issued, was filed as PCT/US2008/003185 on March 7, 2008, and claims the benefit of U.S. Provisional Application No. 60/905,567, filed on March 7, 2007. Jeremy Agresti, Liang-Yin Chu, David A. Weitz, Jin-Woong Kim, Amy Rowat, Morten Sommer, Gautam Dantas, and George Church are the named co-inventors of the 085 Patent. A true and correct copy of the 085 Patent is attached hereto as Exhibit E.

251. Harvard was assigned all rights, title, and interest in all patents and applications that are related to or claim priority to U.S. Provisional Application No. 60/905,567 and/or U.S.

Application No. 12/529,926, including the 085 Patent. Harvard is the sole legal owner of the 085 Patent.

252. 10X is the exclusive licensee, including *inter alia* the right to sue Bio-Rad for its acts of infringement and to recover damages therefrom, of the 085 Patent in an exclusive field that comprises the accused methods of the Accused 085 Instrumentalities, defined below.

253. On December 26, 2017, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 9,850,526, entitled "Assays and Other Reactions Involving Droplets." U.S. Application No. 14/721,558, from which the 526 Patent issued, claims the benefit of U.S. Application No. 14/172,326 (filed on February 4, 2014, now Patent No. 9,068,210), which is a continuation of application No. 12/529,926 (filed as PCT/US2008/003185 on March 7, 2008 and now issued as the 085 Patent), which claims priority to U.S. Provisional Application No. 60/905,567 (filed on March 7, 2007). Jeremy Agresti, Liang-Yin Chu, David A. Weitz, Jin-Woong Kim, Amy Rowat, Morten Sommer, Gautam Dantas, and George Church are the named co-inventors of the 526 Patent. A true and correct copy of the 526 Patent is attached hereto as Exhibit F.

254. Harvard was assigned all rights, title, and interest in all patents and applications that are related to or claim priority to U.S. Provisional Application No. 60/905,567 and/or U.S. Application No. 12/529,926, including the 526 Patent. Harvard is the sole legal owner of the 526 Patent.

255. 10X is the exclusive licensee, including *inter alia* the right to sue Bio-Rad for its acts of infringement and to recover damages therefrom, of the 526 Patent in an exclusive field that comprises the accused compositions of the Accused 526 Instrumentalities, defined below.

256. On information and belief, the 10X Asserted Patents were developed through research conducted by Harvard researcher Dr. David Weitz and others in Dr. Weitz's lab at Harvard.

Jeremy Agresti, the first named inventor of the 10X Asserted Patents, was a post-doctoral fellow in the Weitz lab during the development of the 10X Asserted Patents. The 10X Asserted Patents are a foundational technology for manufacturing gel beads, particularly for applications involving nucleic acids, and for making droplets with beads specific for applications involving nucleic acids. The claims of the 10X Asserted Patents are novel and non-obvious, including without limitation because key limitations of the claims were not known, well-understood, routine, or conventional to a person of skill in the art at the time of the invention, and/or because the ordered combination of steps was not known, well-understood, routine, or conventional. For example, Claim 1 of the 085 Patent is directed to a novel and non-obvious method of manufacturing a gel bead with attached oligonucleotides, and synthesizing a reaction product that is bound to the gel bead. In another example, Claim 13 of the 526 Patent is directed to a novel and non-obvious composition: monodisperse aqueous droplets comprising gel particles with reagents for carrying out nucleic acid amplification. The claims depending from Claim 1 of the 085 Patent and Claim 13 of the 526 Patent likewise contain limitations and/or ordered combinations of limitations that were not known, well-understood, routine, or conventional to a person of skill in the art at the time of the inventions. *See, e.g.,* 085 Patent at cols. 35-36; 526 Patent at cols. 35-37.

257. In January 2013, Jeremy Agresti was hired by Bio-Rad as a Senior Staff Scientist to develop NGS technologies for sequencing sample preparation for single cell and other applications. On information and belief, Jeremy Agresti was the principal architect in charge of developing the ddSEQ platform from the project's inception in 2013, and was both Director and Vice-President of R&D at the time of his departure in 2019.

258. In January 2013, on information and belief Bio-Rad knew, should have known, or was willfully ignorant of the existence of U.S. Application No. 12/529,926 (filed as

PCT/US2008/003185 on March 7, 2008, and from which the 085 Patent issued) and of U.S. Provisional Application No. 60/905,567 (filed on March 7, 2007).

259. On information and belief, Bio-Rad knew, should have known, or was willfully ignorant of the existence of the 085 Patent on or around May 12, 2015—the day it issued—because at that time Bio-Rad product developers and legal counsel were tracking the patent family claiming priority to U.S. Application No. 12/529,926 (filed as PCT/US2008/003185) through the U.S. Patent Office.

260. On information and belief, Bio-Rad knew, should have known, or was willfully ignorant of the existence of the 526 Patent on or around December 26, 2017—the day it issued—because at that time Bio-Rad product developers and legal counsel were tracking the patent family claiming priority to U.S. Application No. 12/529,926 (filed as PCT/US2008/003185) through the U.S. Patent Office.

261. On information and belief, Jeremy Agresti and Bio-Rad became aware of Harvard's license to 10X of the patent family claiming priority to U.S. Application No. 12/529,926 (filed as PCT/US2008/003185), including the 085 Patent and the 526 Patent, through communications with Harvard and Jeremy's Agresti's receipt of royalty payments from Harvard relating to 10X's license.

262. On September 19, 2018, Bio-Rad announced the release of its ATAC-seq products. Jeremy Agresti was responsible, on information and belief, for both developing and supervising the development of Bio-Rad's ATAC-seq for nuclei protocols and workflow while he was employed at Bio-Rad between January 2013 and January 2019.

263. On information and belief, Bio-Rad, availed itself of Jeremy Agresti's knowledge and assistance in developing its products and workflow for ATAC-seq for nuclei. In developing its

ATAC-seq for nuclei products and workflow, on information and belief, Bio-Rad knew that the technologies are protected by the 10X Asserted Patents and exclusively licensed to 10X.

THE BIO-RAD ACCUSED INSTRUMENTALITIES

264. The "085 Accused Instrumentalities" are all Bio-Rad products and components that are imported, exported, made, used, sold, and/or offered for sale by or on behalf of Bio-Rad in connection with and/or as part of generating gel bead reagent libraries for the generation of barcoded gel beads used in kits for Bio-Rad's ATAC-seq assay for isolated nuclei. Without being limited to the following named products and components, the 085 Accused Instrumentalities include at least SureCell ATAC-Seq Reagent Box A and ATAC Barcode Mix, and also any products or services that include or use barcoded gel beads in performing Bio-Rad's ATAC-seq workflow for nuclei (*e.g.*, Bio-Rad's SureCell ATAC-Seq Library Prep Kits).

265. The "526 Accused Instrumentalities" are all Bio-Rad products and components that are imported, exported, made, used, sold, and/or offered for sale by or on behalf of Bio-Rad in connection with and/or as part of sample preparation for sequencing (specifically, generating droplets comprising barcode beads and isolated nuclei) in Bio-Rad's Single-Cell ATAC-Seq workflow for nuclei, including without limitation all Bio-Rad kits, microfluidic cartridges and cartridge holders, reagents, and instruments used to coencapsulate nuclei and barcoded gel beads for Bio-Rad's Single-Cell ATAC-Seq workflow for nuclei, and/or products containing the same. Without being limited to the following named products and components, the 526 Accused Instrumentalities include at least Bio-Rad's SureCell ATAC-Seq Library Prep Kits, ddSEQ M Cartridges, SureCell ATAC-Seq Reagent Boxes A & B, ATAC Enzyme Buffer, ATAC Enzyme, Enhancer Enzyme, ATAC Barcode Buffer, ATAC Barcode Mix, SureCell ddSEQ Index Kit and/or SureCell ATAC-Seq Index Kit, and ddSEQ Single-Cell Isolators used in Bio-Rad's Single-Cell ATAC-Seq workflow for nuclei.

266. The "Bio-Rad Accused Instrumentalities" include the 085 Accused Instrumentalities and the 526 Accused Instrumentalities.

COUNT XIV
(Infringement of U.S. Patent No. 9,029,085)

267. 10X incorporates and realleges paragraphs 241-266 above as if fully set forth herein.

268. On information and belief, Bio-Rad has infringed and continues to willfully infringe one or more claims of the 085 Patent, including but not limited to Claims 1, 3-9, 11, 18, and 19 (the "085 Preliminary Claims") pursuant to 35 U.S.C. 271(a), literally or under the doctrine of equivalents, by making and/or using, offering to sell, selling, exporting, and/or importing into the United States without authority the 085 Accused Instrumentalities. As an example, attached as Exhibit G is a preliminary and exemplary claim chart showing Bio-Rad's infringement of multiple claims of the 085 Patent. This chart is not intended to limit 10X's right to modify this chart or any other claim chart or allege that other Bio-Rad instrumentalities are used to infringe the identified claims or any other claims of the 085 Patent or any other patents. Exhibit G is hereby incorporated by reference in its entirety. Each claim element in Exhibit G that is mapped to the 085 Accused Instrumentalities shall be considered an allegation within the meaning of the Federal Rules of Civil Procedure and therefore a response to each allegation is required.

269. On information and belief, Bio-Rad is aware of or has acted with willful blindness to the existence of the 085 Patent and the infringement of the 085 Patent as described above. On information and belief, Bio-Rad knew, should have known, or was willfully blind to the existence of the 085 Patent as described above. Moreover, on information and belief, Bio-Rad has known, should have known, or has been willfully blind since before its launch of ATAC-seq and as early as May 12, 2015, that its bead generation infringes one or more claims of the 085 Patent.

270. Bio-Rad's infringement of the 085 Patent has been and continues to be willful, deliberate, and in disregard of 10X's exclusive patent rights. Bio-Rad had knowledge of the 085 Patent as described above, and has proceeded to design, develop, market, and sell the 085 Accused Instrumentalities, with full knowledge that they infringe the 085 Patent. Bio-Rad's intentional,

knowing, egregious, culpable, willful, wanton, malicious, bad faith, deliberate, consciously wrongful, and/or flagrant infringement entitles 10X to increased damages under 35 U.S.C. § 284 and to attorneys' fees and costs incurred in prosecuting this action under 35 U.S.C. § 285.

271. Bio-Rad's reliance on its employee Jeremy Agresti's knowledge and assistance in the development of bead generation for Bio-Rad's ATAC-seq for nuclei precludes Bio-Rad from challenging the validity of the 10X Asserted Patents, including as a defense to its liability for infringement thereof.

272. 10X has suffered and continues to suffer damages as a result of Bio-Rad's infringement of the 085 Patent.

COUNT XV
(Infringement of U.S. Patent No. 9,850,526)

273. 10X incorporates and realleges paragraphs 241-272 above as if fully set forth herein.

274. On information and belief, Bio-Rad has infringed and continues to willfully infringe one or more claims of the 526 Patent, including but not limited to Claims 7, 9-10, and 13-16 (the "526 Preliminary Claims") pursuant to 35 U.S.C. 271(a), literally or under the doctrine of equivalents, by making and/or using, offering to sell, selling, exporting, and/or importing into the United States without authority the 526 Accused Instrumentalities. As an example, attached as Exhibit H is a preliminary and exemplary claim chart showing Bio-Rad's infringement of multiple claims of the 526 Patent. This chart is not intended to limit 10X's right to modify this chart or any other claim chart or allege that other Bio-Rad instrumentalities are used to infringe the identified claims or any other claims of the 526 Patent or any other patents. Exhibit H is hereby incorporated by reference in its entirety. Each claim element in Exhibit H that is mapped to the 526 Accused Instrumentalities shall be considered an allegation to within the meaning of the Federal Rules of Civil Procedure and therefore a response to each allegation is required.

275. On information and belief, Bio-Rad has induced and continues to induce infringement of one or more claims of the 526 Patent, including but not limited to the 526

Preliminary Claims, pursuant to 35 U.S.C. § 271(b) and (f) by encouraging, instructing, and/or aiding and abetting third parties such as users, customers, affiliates, parents, subsidiaries, importers, exporters, and/or sellers to at least use the 526 Accused Instrumentalities to infringe one or more claims of the 526 Patent. Bio-Rad either itself acts or induces others to use the 526 Accused Instrumentalities to generate the claimed compositions as described in Exhibit H. Bio-Rad advertises the 526 Accused Instrumentalities and encourages the use of 526 Accused Instrumentalities by other entities by designing, selling, offering for sale, marketing, advertising, and instructing on the use of its ATAC-seq workflow for nuclei. *See* Bio-Rad's "How Single-Cell ATAC-Seq Works" video, available at https://www.youtube.com/watch?v=9K5Q7oEO7ss. *See also* the instruction, marketing, and advertising presented by Bio-Rad at https://www.bio-rad.com/en-us/product/surecell-atac-seq-library-prep-kit?ID=PEXSR1MC1ORV&source_wt=ATACSeqToolkit, including the "Overview", "Description," "Documents," "Downloads," and "Datasets" provided therein, and including for example the following documents.

- https://www.bio-rad.com/webroot/web/pdf/lsr/literature/Bulletin_7167.pdf ("Bulletin 7167");
- http://www.bio-rad.com/webroot/web/pdf/lsr/literature/ATAC-Seq_Poster.pdf (SureCell ATAC-Seq Library Prep Kit "Poster");
- https://www.bio-rad.com/webroot/web/pdf/lsr/literature/10000106678.pdf (SureCell ATAC-Seq Library Preparation Kit, "User Guide"); and
- https://www.bio-rad.com/webroot/web/pdf/lsr/literature/10000069430.pdf ("ddSEQ Single Cell Isolator Instruction Manual").

276. As a result of Bio-Rad's marketing, advertising, instruction, and sales, other entities on information and belief use the 526 Accused Instrumentalities for their intended purpose and according to their instructions with the result that such entities—such as Bio-Rad's customers and users of the 526 Accused Instrumentalities—directly infringe the asserted claims of the 526 Patent, literally or under the doctrine of equivalents, for the reasons stated above. *See* https://www.diagenode.com/en/p/single-cell-atac-seq-service (Diagenode, commercial Single-Cell ATAC-seq Services, for which Bio-Rad is a preferred service provider; North American

headquarters in Denville, New Jersey). Bio-Rad not only instructs Diagenode on how to use the 526 Accused Instrumentalities, Bio-Rad instructs users, customers, researchers, and other entities that Diagenode is a preferred provider of the 526 Accused Instrumentalities. *See* November 19, 2019 Bio-Rad Press Release, "Diagenode to Offer Single-Cell ATAC-Seq Services Featuring Bio-Rad's Droplet Digital Technology," at https://www.bio-rad.com/en-us/life-science-research/news/diagenode-offer-single-cell-atac-seq-services-featuring-bio-rads-droplet-digital-technology?ID=Diagenode-to-Offer-S_1574112433 ("Diagenode, Inc. … and Bio-Rad Laboratories, Inc. … today announced a partnership in which Diagenode will offer Single-Cell ATAC-Seq (scATAC-Seq) Services, featuring Bio-Rad's Droplet Digital technology, to help advance epigenomics research."). As explained below, on information and belief, Bio-Rad performs the above acts or has them performed on its behalf knowing and intending that such acts will result in such other entities using the 526 Accused Instrumentalities, while knowing or being willfully blind that such acts of use constitute direct infringement of the asserted claims of the 526 Patent.

277. On information and belief, Bio-Rad has contributed to the infringement of one more claims of the 526 Patent, including but not limited to the 526 Preliminary Claims pursuant to 35 U.S.C. § 271(c) and (f) by importing, selling, exporting, and/or offering for sale the 526 Accused Instrumentalities, or has others perform such acts on its behalf, specifically so that those 526 Accused Instrumentalities will be used to infringe one or more claims of the 526 Patent. Further, the 526 Accused Instrumentalities were designed specifically to be used in a manner that infringes the asserted claims of the 526 Patent. For example, and without limitation, Bio-Rad's ATAC-Seq Library Prep Kits, SureCell ATAC-Seq Reagent Boxes A & B, ATAC Enzyme Buffer, ATAC Enzyme, ATAC Barcode Buffer, ATAC Barcode Mix, and SureCell ATAC-Seq Index Kit are material components of the claimed inventions. When these components are used, the claims of the 526 Patent are infringed, as described above. Thus, these components are a material part of the claimed inventions of the 526 Patent that when used result in infringement. As a result of Bio-Rad's importing selling, exporting, and/or offering for sale 526 Accused Instrumentalities, other entities

on information and belief use the 526 Accused Instrumentalities for their intended purpose and according to their instructions with the result that such entities—such as Bio-Rad's customers and users of the Accused Instrumentalities, e.g., Diagenode—directly infringe the asserted claims of the 526 Patent, literally or under the doctrine of equivalents, for the reasons stated above. *See* https://www.diagenode.com/en/p/single-cell-atac-seq-service (Diagenode, commercial Single-Cell ATAC-seq Services, for which Bio-Rad is a preferred service provider; North American headquarters in Denville, New Jersey). As explained below, on information and belief, Bio-Rad acts and has acted—including specifically by supplying the 526 Accused Instrumentalities and/or components thereof—knowing and willfully blind as to the existence of the 526 Patent claims and as to the fact that the 526 Accused Instrumentalities are especially made and adapted for this use in an infringing manner, are not staple articles of commerce capable of substantial non-infringing uses.

278. On information and belief, Bio-Rad is aware of or has acted with willful blindness to the existence of the 526 Patent and the infringement of the 526 Patent, as described above, by third parties, including without limitation users, customers, affiliates, parents, subsidiaries, third parties, importers, exporters, and/or sellers. On information and belief, Bio-Rad knew, should have known, or was willfully blind to the existence of the 526 Patent as described above. Moreover, on information and belief, Bio-Rad has known, should have known, or has been willfully blind since December 26, 2017, that its ATAC-seq workflow for nuclei infringes one or more claims of the 526 Patent.

279. Bio-Rad's reliance on its employee Jeremy Agresti's knowledge and assistance in the development of Bio-Rad's ATAC-seq for nuclei protocols and workflow precludes Bio-Rad from challenging the validity of the 10X Asserted Patents, including as a defense to its liability for infringement thereof.

280. 10X has suffered and continues to suffer damages as a result of Bio-Rad's infringement of the 526 Patent.

281. Bio-Rad's infringement of the 526 Patent has been and continues to be willful, deliberate, and in disregard of 10X's exclusive patent rights. Bio-Rad had knowledge of the 526

Patent as described above, and has proceeded to design, develop, market, and sell the 526 Accused Instrumentalities, with full knowledge that they infringe the 526 Patent. Bio-Rad's intentional, knowing, egregious, culpable, willful, wanton, malicious, bad faith, deliberate, consciously wrongful, and/or flagrant infringement entitles 10X to increased damages under 35 U.S.C. § 284 and to attorneys' fees and costs incurred in prosecuting this action under 35 U.S.C. § 285.

PRAYER FOR RELIEF

WHEREFORE, 10X respectfully requests that the Court enter the following relief in its favor and against Bio-Rad and Harvard:

A. That Bio-Rad and Harvard's Complaint be dismissed with prejudice and Bio-Rad and Harvard take nothing with respect to Bio-Rad and Harvard's Complaint;

B. Judgment in favor of 10X against Bio-Rad and Harvard's Complaint;

C. A declaration that the 444 Patent is invalid;

D. A declaration that the 444 Patent is unenforceable for inequitable conduct.

E. A declaration that 10X has not infringed any claim of the 444 Patent;

F. A declaration that the 277 Patent is invalid;

G. A declaration that the 277 Patent is unenforceable for inequitable conduct.

H. A declaration that 10X has not infringed any claim of the 277 Patent;

I. A declaration that Bio-Rad's acquisition of RainDance was anticompetitive and unlawful;

J. A declaration that Bio-Rad has unlawfully monopolized the ddPCR Product Market;

K. A declaration that Bio-Rad has unlawfully attempted to or actually monopolized the Droplet Genetic Analysis Technology Market;

L. A declaration that Bio-Rad has unlawfully attempted to monopolize the Droplet Single-Cell Product Market;

M. A declaration that Bio-Rad has engaged in unfair competition under the UCL;

N. A permanent injunction requiring Bio-Rad to divest all patents and patent licenses as well as the ddPCR products it obtained in connection with its acquisition of RainDance to a third party willing and able to license such patents at competitive rates and that will not inflate such rates based on the incentive to foreclose competitors in the Droplet Single-Cell Product Market, and that is willing to sell such ddPCR products at competitive prices;

O. In the alternative where Bio-Rad is allowed to keep the RainDance assets, a permanent injunction requiring Bio-Rad to license at competitive rates and/or rates not inflated by the incentive to foreclose competitors in the Droplet Single-Cell Product Market all patents it obtained or licensed in connection with its acquisition of RainDance and all patents in the same Droplet Genetic Analysis Technology Market as such acquired RainDance patents regardless of when Bio-Rad obtained or licensed such patents;

P. An injunction requiring Bio-Rad to cease all activities constituting unfair competition under the UCL;

Q. An award of damages (including lost profits) in 10X's favor in an amount to be determined, trebled to the extent permitted by the antitrust laws;

R. A judgment that Bio-Rad has infringed and continues to infringe one or more claims of the 10X Asserted Patents;

S. A judgment that Bio-Rad has induced infringement and continues to induce infringement of one or more claims of the 10X Asserted Patents;

T. A judgment that Bio-Rad has contributed and continues to contribute to infringement of one or more claims of the 10X Asserted Patents;

U. A judgment that Bio-Rad has willfully infringed one or more claims of the 10X Asserted Patents;

V. An award of all monetary relief adequate to compensate for damages resulting from Bio-Rad's infringement, including lost profits but in no event less than a reasonable royalty under 35 U.S.C. § 284 for Bio-Rad's infringement, including all pre-judgment and post-judgment interest at the maximum rate allowed by law;

W. A judgment awarding treble patent damages pursuant to 35 U.S.C. § 284 as a result of Bio-Rad's willful conduct in relation to the 10X Asserted Patents;

X. That Bio-Rad be required to pay 10X's attorneys' fees and costs;

Y. A declaration that the case is an exceptional case and that Bio-Rad be required to pay 10X's attorneys' fees pursuant to 35 U.S.C. § 285;

Z. A judgment awarding 10X such other and further relief as the Court may deem just, reasonable, and proper.

10X reserves the right to amend its Answer and Second Amended Counterclaims to raise additional defenses and counterclaims as warranted by subsequent investigation and/or analysis or if Plaintiffs are granted leave to amend their pleadings.

DEMAND FOR JURY TRIAL

10X acknowledges Plaintiffs' request for a jury trial, and pursuant to Rule 38(b) of the Federal Rules of Civil Procedure, 10X also demands a jury trial on all issues so triable.

Date: July 13, 2020

Respectfully submitted,

/s/ *Matthew D. Powers*

Matthew D. Powers (*pro hac vice*)
Paul T. Ehrlich (*pro hac vice*)
Stefani C. Smith (*pro hac vice*)
Robert L. Gerrity (*pro hac vice*)
Jennifer K. Robinson (*pro hac vice*)
Natasha M. Saputo (*pro hac vice*)
Utsav Gupta (*pro hac vice*)
Gina Cremona (*pro hac vice*)
Daniel Radke (*pro hac vice*)
TENSEGRITY LAW GROUP, LLP
555 Twin Dolphin Drive, Suite 650
Redwood Shores, CA 94065
Telephone: (650) 802-6000
Facsimile: (650) 802-6001
10x_BR_MA_Service@tensegritylawgroup.com

Azra M. Hadzimehmedovic (*pro hac vice*)
Aaron M. Nathan (*pro hac vice*)
Samantha A. Jameson (*pro hac vice*)
Kiley White (*pro hac vice*)
TENSEGRITY LAW GROUP, LLP
8260 Greensboro Drive, Suite 260
McLean, VA 22102
Telephone: (703) 940-5033
Facsimile: (650) 802-6001
10x_BR_MA_Service@tensegritylawgroup.com

Sarah Chapin Columbia (BBO #550155)
Katrina Rogachevsky (BBO #691373)
MCDERMOTT WILL & EMERY LLP
200 Clarendon Street, Floor 58
Boston, Massachusetts 02116-5021
Telephone: (617) 535-4000
Facsimile: (617) 535-3800
10X-BR-MWE@mwe.com

Leah Brannon (*pro hac vice*)
Kenneth Reinker (*pro hac vice*)
CLEARY GOTTLIEB
2112 Pennsylvania Avenue, NW
Washington, DC 20037
Telephone: (202) 974-1500

Facsimile: (202) 974-1999
lbrannon@cgsh.com
kreinker@cgsh.com

Attorneys for 10X Genomics, Inc.

CERTIFICATE OF SERVICE

The undersigned hereby certifies that on July 13, 2020, a copy of the foregoing document was electronically filed with the clerk of the Court using the CM/ECF system, which will issue an electronic notification of filing to all counsel of record.

/s/ Matthew D. Powers
Matthew D. Powers